



Ichthyofaunal diversity of Chilika Lake, Odisha, India: an inventory, assessment of biodiversity status and comprehensive systematic checklist (1916–2014)

Surya K. Mohanty¹, Subhrendu Shekhar Mishra², Muntaz Khan¹, Rajeeb K. Mohanty^{4*}, Anil Mohapatra³ and Ajit K. Pattnaik¹

¹ Chilika Development Authority, Bhubaneswar - 751 014, Odisha, India

² Marine Fish Section, Zoological Survey of India, Kolkata, India

³ Marine Aquarium and Regional Centre, Zoological Survey of India, Digha, India - 721 428, West Bengal

⁴ Indian Institute of Water Management (ICAR), Bhubaneswar - 751 023, Odisha, India

* Corresponding author. E-mail rajeebm@yahoo.com

Abstract: Chilika Lake, an assemblage of marine, brackish and freshwater ecosystems, on the east coast of India is a designated Ramsar site and a biodiversity hotspot. Intensive ichthyofaunal inventories and biodiversity assessments were carried out during 2000–2014 and documented 317 species belonging to 207 genera, in 88 families and 23 orders, including two endemic (Gobiidae) and one exotic cichlid species (*Oreochromis mossambicus*). In total, 255 collections (178 collections of previously recorded species and 77 that represent newly recorded species) were made during a post-restoration survey accounting for 80.44% retrieval of historically documented species. This paper presents an updated and comprehensive checklist of the lake's ichthyofauna (1916–2014), which is comprised of 278 food fishes, 271 (85.49%) migratory and 46 (14.51%) are resident species indicating that the lake fishery is largely migratory species-dependent. An account of faunal characteristics for 129 commercially important species is provided. The checklist also documents 48 threatened species and 103 species under different categories of conservation status.

Key words: ichthyofauna, Chilika Lake, biodiversity, checklist, species inventory

INTRODUCTION

Chilika Lake (Figure 1) is the largest coastal wetland ecosystem on the Indian subcontinent (Mohapatra et al. 2007) and the largest brackish water lake in Asia (Mangla 1989; Dujovny 2009). It is one of the region's finest repositories of aquatic biodiversity and a fisheries resource supporting the livelihoods and nutritional

security of more than 200,000 local fishers. The unique and fragile ecosystem of Chilika Lake gradually began to lose its ecological integrity due to coastal processes, significant decrease in salinity regime, and degraded drainage basin with associated anthropogenic impacts (Mohanty et al. 2009). Between 1950 and 2000, the lake fishery was in a continuing state of decline when the fisheries output reached its lowest point by the end of the 1990s. The lake fishery suffered serious setbacks since the later part of the 1980s with the salinity level sharply decreasing to 9.6 PSU, compared to a level of more than 22.0 PSU in the 1960s (Banerjee and Roychoudhury 1966; Siddiqi and RamaRao 1995; Mohanty et al. 2009). The recruitment corridors (outer channel and Palur canal) also gradually silted up, adversely affecting the recruitment of fish and shellfish seed from the sea into the lake, while silted up river mouths (Mahanadi tributaries draining into the lake) in the northern sector of the lake also affected freshwater seed recruitment from riverine sources. In the aftermath of the gradual closure of the old lake mouth and Palur canal, the lake began transformation towards a freshwater ecosystem, causing substantial changes in the ichthyofaunal composition. Continued degradation of the ecosystem, changes in ecological characteristics, overall loss of biodiversity and decline in productivity adversely affected the livelihoods of local communities. In 1993, Chilika Lake was included on the Montreux Record of the Ramsar convention for its deteriorated state of health.

It became imperative to take action for the restoration of the fragile ecosystem of the Chilika Lake and *interalia* enhance its fisheries and bioresources for the greater benefit of the communities depending on them. Chilika

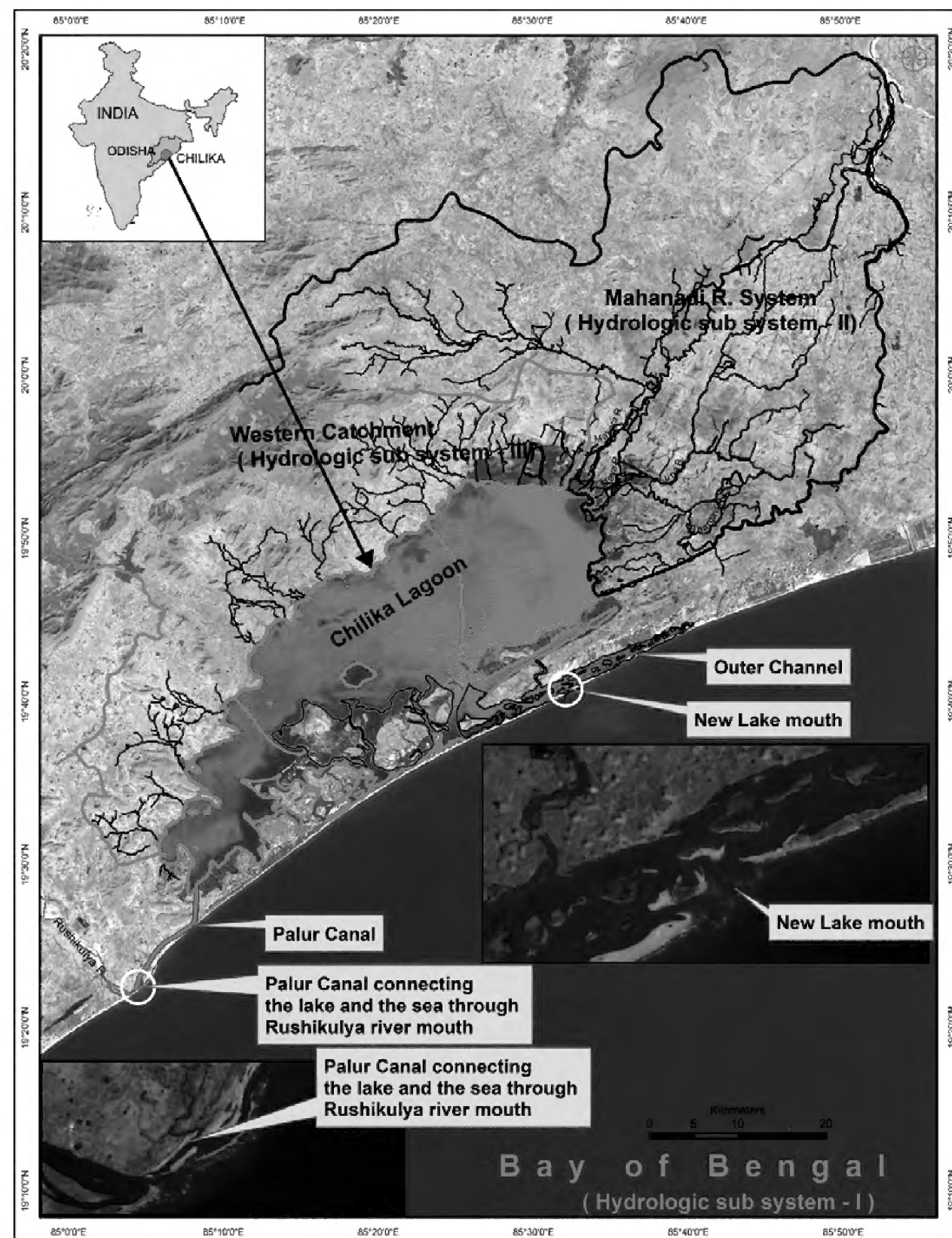


Figure 1. Location map of Chilika Lake and its connection with river systems and the Bay of Bengal.

Development Authority (CDA), based on the outcome of a rigorous numerical model study (Mohapatra et al. 2007), carried out a hydrological intervention by opening a new lake mouth during September 2000 along with the treatment of catchment and other restoration measures (Ghosh et al. 2006). Opening of the new lake mouth rapidly had a positive effect with spectacular enhancement in fisheries, overall ecology, and biodiversity. The annual fish catch from the lake increased sevenfold as compared to the catch in the pre-restoration period. After an assessment of the improvement of the lake ecosystem including biodiversity, the Ramsar Bureau removed the lake from the Montreux Record in 2002.

The pristineness of the lake and its fisheries had sharply declined during the eco-degradation phase but was successfully restored with enhancement in fish catch and fish diversity during the post-restoration period, i.e., after 2000 (Mohanty et al. 2007). During 1985–1987 (eco-degradation phase), the Zoological Survey of India (ZSI) conducted the Chilika Lake expeditions (1985–1987) and collected only 70 species (with four

newly recorded species) which clearly documented the apparent loss of diversity and poor status of the lakes' ichthyofauna. Species diversity and genetic variability are necessary for long-term maintenance of stable complex ecosystems and species inventories are a relatively efficient and inexpensive tool for the monitoring of biodiversity, especially in areas that have suffered high rates of deforestation (Raiol et al. 2012) and ecosystem degradation (Mohanty et al. 2007). With the evolution of Chilika Lake about 3,500–4,000 years ago (UNESCO 2014), a large number of both marine and riverine species took the opportunity to use this lake's habitat. The uniqueness of Chilika Lake is characterized by a fish fauna that constitutes a mix of species belonging to fresh, marine and brackish water habitats. Identification, listing and prioritization of species are one of the important tasks for conservation of biodiversity (Molur and Walker 1998). Conservation and sustainable management of ichthyofaunal biodiversity in an aquatic ecosystem assume a greater importance in India as fishery resources have historically been, and continue to

remain, a base for livelihood and access to high quality animal protein. The overall fish biodiversity status in Indian wetlands has increasingly been threatened by natural ecophysiological changes and anthropogenic pressures. Ichthyofaunal checklists of such wetlands and periodical inventories of species are therefore powerful tools and prerequisites for assessment of changes in biodiversity, following changes in ecological integrity and alteration of ecosystem functioning.

Thorough review of widely scattered literature revealed that 217 fish species (Chaudhuri 1916a, 1916b, 1916c; 1917; 1923; Hora 1923; Koumans 1941; Jones and Sujansinghani 1954; Devasundaram 1954; Roy and Sahoo 1957; Menon 1961; Misra 1962; Rajan et al. 1968; Misra 1969; 1976a; 1976b; Talwar and Kacker 1984; Talwar and Jhingran 1991; Rama Rao 1995) were reported from Chilika Lake (Rama Rao 1995) since the beginning of ichthyofaunal surveys in 1916. However, previous authors inadvertently missed recording some species, including eight species reported by Mohanty (1973). Furthermore, eight additional species collected during 1998–2000 (Bhatta et al. 2001) were newly recorded as part of the fauna of Chilika Lake before the hydrological intervention. Some of the species reported earlier are now considered synonyms or invalid. Thus during the pre-restoration period (until 2000) a total of 233 species had been reported as present in the lake. As reported by Mohanty et al. (2007), during 2000–2003 (post-restoration phase) a total of 43 species were recorded for the first time, bringing the total to 276 species.

The present work provides an intensive inventory of the ichthyofauna of Chilika Lake in the post-restoration phase (2000–2014) to assess the presence of earlier recorded species and report new records. It also compiles a comprehensive systematic checklist with updates on the taxonomy of fishes of Chilika Lake. This will serve as a baseline of the ichthyofaunal diversity of the lake and will facilitate future ichthyofaunal surveys, monitoring and fish biodiversity studies.

MATERIALS AND METHODS

Study site

The study area comprises the entire Chilika Lake, which is located along the east coast of India in the state of Odisha between latitudes 19°20'13.06" N and 19°54'47.02" N and longitudes 085°06'49.15" E and 085°35'32.87" E (Figure 1). The inundation area of the lake varies between 1,165 km² during monsoon to a minimum of 906 km² during the dry summer season. The lake's length is 64.3 km and its mean width 20.1 km (Ghosh and Pattnaik 2005). The lake is separated from the Bay of Bengal by a sandbar of 100–1,500 m width; an outer channel 32 km long connects the main lake with the Bay of Bengal. The total Chilika drainage basin including the lake itself and the contributing Islands

and coastal strip (Figure 2) is 4,300 km² (World Bank 2005). Hydrologically Chilika is influenced by three subsystems: the Mahanadi River tributaries, some 52 rivers and streams draining into the lake from the western catchment, and the Bay of Bengal (World Bank 2005). Ecologically the lake is an assemblage of very to relatively shallow (0.38–6.2 m) marine, brackish and freshwater environs. It is primarily the dynamic salinity regime that enables the lake to support high biodiversity and a productive fishery. The salinity dynamics are controlled jointly by the nature of the connection to the sea, associated tidal fluctuations, and the volume and timing of freshwater inflows to the lake (World Bank 2005). The lake is broadly divided into four ecological sectors namely Northern, Central, Southern, and Outer Channel (Figure 3) based on varying salinity dynamics, depth and nature of the lake water. Magarmukh acts as the gateway between the main lake and the outer channel.

Sampling and data analysis

The ichthyofaunal inventory and biodiversity assessment was carried out from September 2000 to March 2014 following the methodology of Mohapatra et al. (2007). Specimens were collected from six major fish landing centres (Bhusandapur, Kalupadaghat, Sorona, Balugaon, Palur and Arakhakuda) and from five fishing grounds (FG 1, 2, 3, 4 and 5) in the lake as shown in Figure 3, resulting in 10 sampling stations in total. As far as possible, collections were identified in the field.

Specimens that could not be identified in the field were placed on ice and taken to the laboratory of Wetland Research and Training Centre (WRTC) of CDA and identified following Fischer and Bianchi (1984), Talwar and Kacker (1984), Talwar and Jhingran (1991), De Bruin et al. (1994), Mishra and Krishnan (1997), Venkateswaralu (1990), Krishnan and Mishra (2001), Barman et al. (2007), Rao (2009), Jayaram (2010) and Froese and Pauly (2015). All collections, after identification, were deposited with a voucher number, organization and year in the fish museum of the Wetland Research and Training Centre (WRTC) of Chilika Development Authority (CDA).

An updated, comprehensive, checklist of fishes reported from Chilika Lake from 1916 to 2014 (98 years) with their current valid names, common English names and succinct information on the current status of species, environment, interest to fisheries, ornamental value, conservation status, conservation category, resident and migratory nature, and endemism was prepared after verification with published literature and web based information such as FishBase (Froese and Pauly 2015) and the Catalog of Fishes (Eschmeyer 2014). The classification adopted mainly follows Eschmeyer and Fong (2014) and Nelson (2006), with genera and species

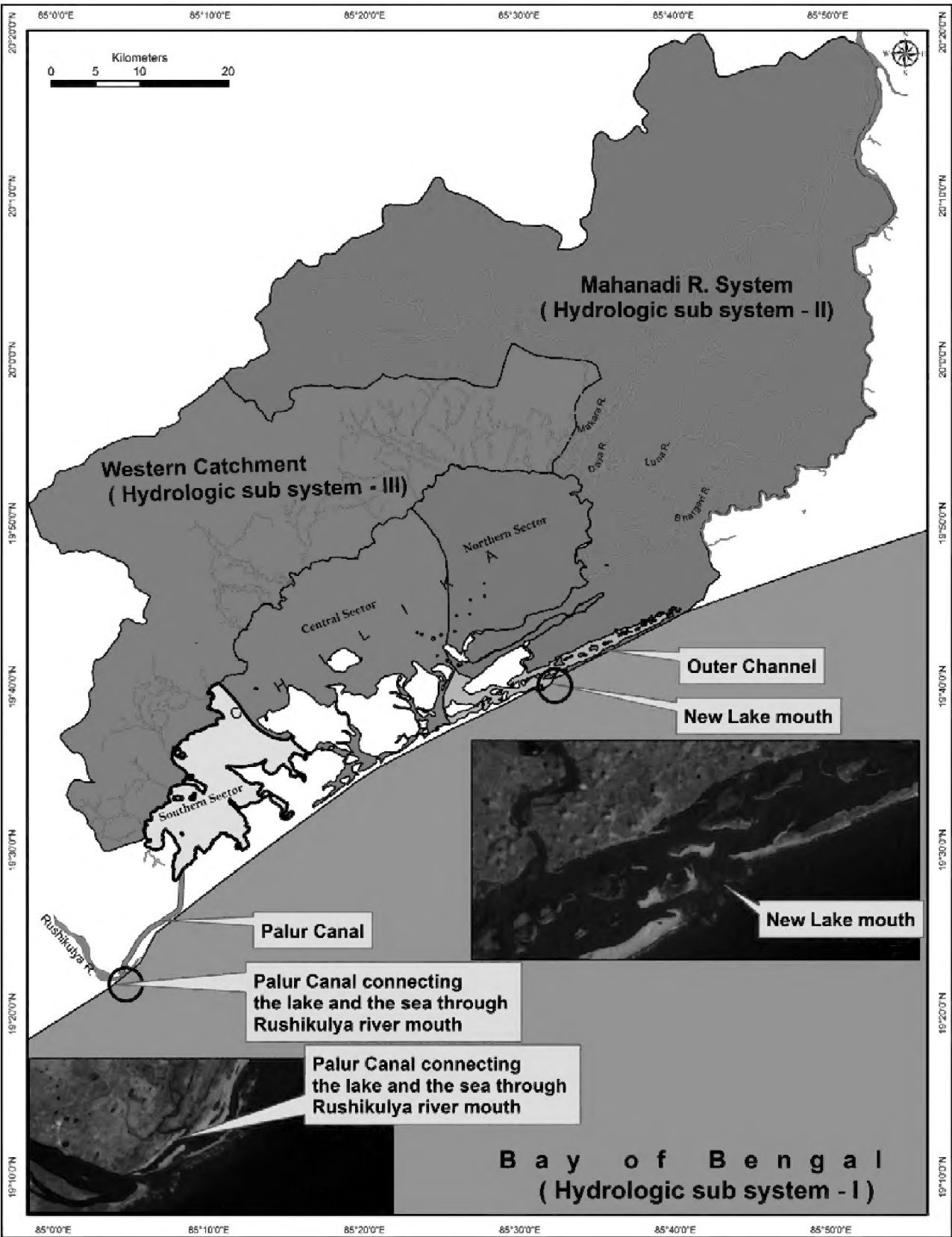


Figure 2. Drainage basin of Chilika Lake with three hydrologic subsystems indicat

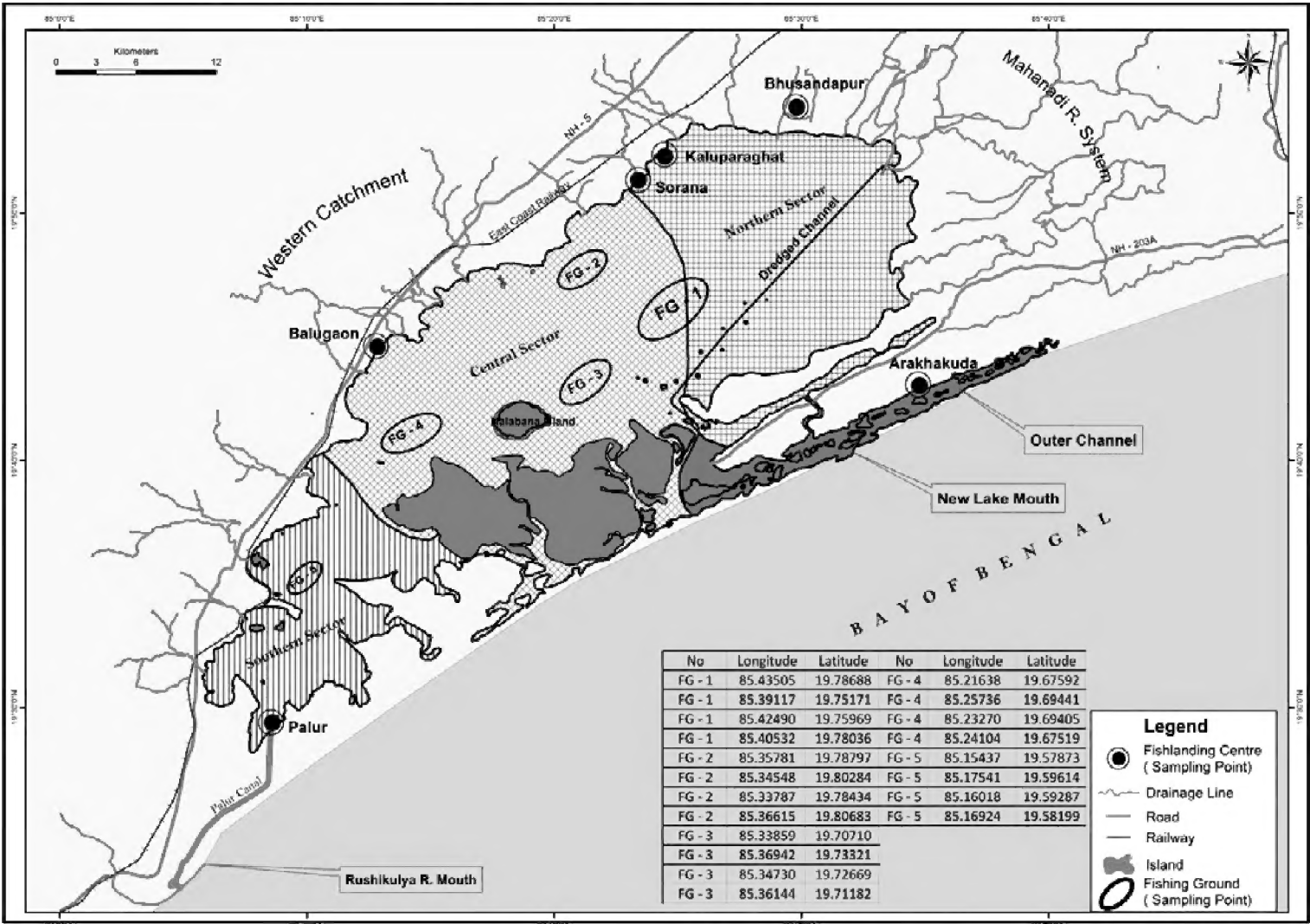


Figure 3. Ichthyofaunal sampling stations in Chilika Lake.

arranged alphabetically. With a view to resolving some taxonomic issues, Kottelat (2013) was consulted.

The conservation status for the species was gathered from the IUCN Red List (IUCN 2014) as well as Ponniah (1993), Molur and Walker (1998), Menon (2004), Barman et al. (2007) and Lakra et al. (2010).

With a view to understanding the impact of environmental factors on ichthyofaunal diversity, secondary data for water quality parameters for both pre- and post-restoration periods were collected from the Chilika Development Authority, Bhubaneswar.

RESULTS AND DISCUSSION

Species diversity

An updated checklist of fishes reported from Chilika Lake (Table 1) during the last 84 years of pre-restoration (1916–2000) and 14 years of post-restoration (2000–2014) results in a total of 317 valid species (18 cartilaginous and 299 bony fishes) belonging to 207 genera, 88 families and 23 orders (Table 2). These are inclusive of 77 new records made during the post-restoration

period. Eschmeyer and Fong (2014) considered the family Mugilidae as Perciformes and placed this family between Cepolidae and Cichlidae. However, Nelson (2006) placed this family in Mugiliformes, as did Froese and Pauly (2014) and that classification is followed here. One sparid species, *Acanthopagrus latus*, earlier recorded from Chilika Lake was later considered as *Acanthopagrus longispinnis*. Similarly, the name of the Indian species, *Lutjanus russellii* (Lutjanidae) was reassigned as *Lutjanus indicus* (Allen et al. 2013). The Indian snapper *Lutjanus indicus* was invariably confused with its sibling species *L. russellii* (Allen et al. 2013). Species collected during surveys carried out during the post-restoration period are indicated with single asterisk (*) and new records collected during the same period are indicated with double asterisks (**); thus the checklist includes 178 earlier reported species and 77 new records (Mohapatra et al. 2007; Mohanty et al. 2007; Satpathy and Panda 2009; Mohapatra et al. 2013 and 2014) made during the post-restoration period totaling 255 collected out of 317 species known from the lake, accounting for a 80.44%

Table 1. Checklist of fishes reported from Chilika Lake (1916–2014). ** New records during post-restoration period (n=77). * Inventory during post-restoration period (n=178+77=255). Recorded species but not collected (n=62).

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
Class Chondrichthyes					
Subclass Elasmobranchii (Cartilaginous fishes)					
Order Orectolobiformes					
Family Hemiscyllidae (Bamboo sharks)					
Genus <i>Chiloscyllium</i> Müller, Henle 1837					
<i>Chiloscyllium indicum</i> (Gmelin, 1789)**	Slender Bambooshark	MBF	NT ^A	CDA/229/2009	Mg
Order Carcharhiniformes					
Family Carcharhinidae (Requiem sharks)					
Genus <i>Carcharhinus</i> Blainville 1816					
<i>Carcharhinus leucas</i> (Muller, Henle, 1839)**	Bull Shark	MBF	NT ^A	CDA/230/2009	Mg,Ci
<i>Carcharhinus limbatus</i> (Muller, Henle, 1839)	Blacktip Shark	BM	NT ^A		Mg,Ci
<i>Carcharhinus melanopterus</i> (Quoy, Gaimard, 1824)	Blacktip Reef Shark	BM	NT ^A		Mg,Ci
Genus <i>Glyphis</i> Agassiz, 1843					
<i>Glyphis gangeticus</i> (Muller, Henle, 1839)	Ganges Shark	MBF	CR ^A		Mg
Genus <i>Scoliodon</i> Müller, Henle 1837					
<i>Scoliodon laticaudus</i> (Muller, Henle, 1838)*	Spadenose Shark	MB	NT ^A	CDA/001/2001	Mg
Family Sphyrnidae (Hammerheaded shark)					
Genus <i>Eusphyra</i> Gill, 1862					
<i>Eusphyra blochii</i> (Cuvier, 1816)**	Winghead Shark	MB	NT ^A	CDA/002/2001	Mg,Ci
Genus <i>Sphyrna</i> Rafinesque 1810					
<i>Sphyrna lewini</i> (Griffith, Smith, 1834)**	Scalloped Hammerhead	MB	EN ^A	CDA/003/2001	Mg
Order Pristiformes					
Family Pristidae (Saw fish)					
Genus <i>Pristis</i> Linck 1790					
<i>Pristis clavata</i> (Garman, 1906)	Smalltooth Sawfish	MB	EN ^A		Mg
Order Rajiformes					
Family Rhinobatidae (Guitar fishes)					
Genus <i>Rhynchobatus</i> Müller, Henle 1837					
<i>Rhynchobatus djiddensis</i> (Forsskal, 1775)**	Giant Guitarfish	MB	VU ^{A,B}	CDA/068/2002	Mg
Order Myliobatiformes					
Family Dasyatidae (Stingrays)					
Genus <i>Himantura</i> Müller, Henle 1837					
<i>Himantura imbricata</i> (Bloch, Schneider, 1801)*	Scaly Whipray	MB	DD ^A	CDA/254/2014	Rs, BC
<i>Himantura marginata</i> (Blyth, 1860)**	Blackedge Whipray	MB	DD ^A	CDA/004/2001	Mg
<i>Himantura uarnak</i> (Gmelin, 1789)*	Honeycomb Stingray	MB	VU ^A	CDA/005/2001	Mg
<i>Himantura walga</i> (Muller, Henle, 1841)*	Dwarf Whipray	M	NT ^A	CDA/006/2001	Mg
Genus <i>Pastinachus</i> Rüppell 1829					
<i>Pastinachus sephen</i> (Forsskal, 1775)*	Cowtail Stingray	BM	DD ^A	CDA/007/2001	Mg, Or, BC
Family Myliobatidae (Eaglerays)					
Genus <i>Aetobatus</i> Blainville, 1816					
<i>Aetobatus flagellum</i> (Bloch, Schneider, 1801)*	Longheaded Eagle Ray	BM	EN ^A	CDA/069/2002	Mg

Continued

Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
<i>Aetobatus ocellatus</i> (Kuhl, 1823)*	Spotted Eagle Ray	BM	NE	CDA/070/2002	Mg, BC
Genus <i>Aetomylaeus</i> Garman, 1908					
<i>Aetomylaeus nichofii</i> (Bloch, Schneider, 1801)*	Banded Eagle Ray	BM	VU ^{A,B}	CDA/071/2002	Mg
Class Osteichthyes (Bony fishes)					
Subclass Actinopterygii					
Subdivision Teleostei					
Order Osteoglossiformes					
Family Notopteridae (Featherbacks)					
Genus <i>Chitala</i> Fowler 1934					
<i>Chitala chitala</i> (Hamilton, 1822)*	Clown Knifefish	F	EN ^{CAMP}	CDA/252/2013	Mg,Ci,Or
Genus <i>Notopterus</i> Lacepède 1800					
<i>Notopterus notopterus</i> (Pallas, 1769)*	Bronze Featherback	FB	LC ^A	CDA/008/2001	Rs, Ci, Or, BC
Order Elopiformes					
Family Elopidae (Tenpounders)					
Genus <i>Elops</i> Linnaeus 1766					
<i>Elops machnata</i> (Forsskal, 1775)*	Tenpounder	BM	LC ^A	CDA/072/2002	Mg,Ci
Family Megalopidae (Tarpons)					
Genus <i>Megalops</i> Lacèpede 1803					
<i>Megalops cyprinoides</i> (Broussonet, 1782)*	Indo-Pacific Tarpon	BM	DD ^A	CDA/073/2002	Mg,Ci
Order Anguilliformes					
Family Anguillidae (Freshwater eels)					
Genus <i>Anguilla</i> Schrank 1798					
<i>Anguilla bengalensis</i> (Gray, 1831)*	Indian Mottled Eel	FB	NT ^A	CDA/235/2010	Mg, Or, Ci
<i>Anguilla bicolor bicolor</i> McClelland, 1844*	Indonesian Shortfin Eel	FB	NT ^A	CDA/236/2010	Mg, Or, Ci
Family Muraenidae (Moray eels)					
Genus <i>Strophidon</i> McClelland 1844					
<i>Strophidon sathete</i> (Hamilton, 1822)*	Slender Giant Moray	MB	NE	CDA/139/2003	Mg
Family Ophichthidae (Snake eels)					
Genus <i>Lamnostoma</i> Kaup 1856					
<i>Lamnostoma orientalis</i> (McClelland, 1844)	Oriental Worm-eel	BM	LC ^A		Mg
Genus <i>Pisodonophis</i> Kaup 1856					
<i>Pisodonophis boro</i> (Hamilton, 1822)*	Rice-Paddy Eel	BM	LC ^A	CDA/074/2002	Mg, NFF
<i>Pisodonophis cancrivorus</i> (Richardson, 1848)	Longfin Snake-eel	MBF	NE		Rs, NFF
Family Muraenesocidae (Pike congers)					
Genus <i>Congresox</i> Gill 1890					
<i>Congresox talabonoides</i> (Bleeker, 1853)*	Indian Pike Conger	B	VU ^{M,B}	CDA/201/2008	Mg
Genus <i>Muraenesox</i> McClelland 1844					
<i>Muraenesox bagio</i> (Hamilton, 1822)**	Common Pike Conger	M	NE	CDA/075/2002	Mg
<i>Muraenesox cinereus</i> (Forsskal, 1775)*	Daggertooth Pike Conger	MB	VU ^{M,B}	CDA/076/2002	Mg
Order Clupeiformes					
Family Dussumieridae					
Genus <i>Dussumieria</i> Valenciennes 1847					
<i>Dussumieria acuta</i> Valenciennes, 1847	Rainbow Sardine	M	NE		Mg
<i>Dussumieria elopsoides</i> Bleeker, 1849**	Slender Rainbow Sardine	M	NE	CDA/078/2002	Mg,Ci
Family Clupeidae (Herrings, allies)					
Genus <i>Amblygaster</i> Bleeker 1849					
<i>Amblygaster leiogaster</i> (Valenciennes, 1847)**	Smoothbelly Sardinella	M	NE	CDA/202/2008	Mg
<i>Amblygaster sirm</i> (Walbaum, 1792)	Spotted Sardinella	M	NE		Mg,Ci
Genus <i>Anodontostoma</i> Bleeker 1849					
<i>Anodontostoma chacunda</i> (Hamilton, 1822)*	Chacunda Gizzard Shad	M	NE	CDA/077/2002	Mg,Ci
Genus <i>Corica</i> (Hamilton 1822)					
<i>Corica soborna</i> Hamilton, 1822*	Ganges River Sprat	B	LC ^A	CDA/242/2011	Mg
Genus <i>Ehirava</i> Deraniyagala 1929					
<i>Ehirava fluviatilis</i> Deraniyagala, 1929**	Malabar Sprat	B	NE	CDA/079/2002	Mg
Genus <i>Escualosa</i> Whitley 1940					
<i>Escualosa thoracata</i> (Valenciennes, 1847)*	White Sardine	M	NE	CDA/161/2004	Mg
Genus <i>Gonialosa</i> Regan 1917					
<i>Gonialosa manmina</i> (Hamilton, 1822)*	Ganges River Gizzard Shad	F	VU ^{CAMP}	CDA/174/2005	Mg,Or
Genus <i>Gudusia</i> Fowler 1911					
<i>Gudusia chapra</i> (Hamilton, 1822)*	Indian River Shad	F	LC ^A	CDA/183/2006	Mg,Or
Genus <i>Hilsa</i> Regan 1917					
<i>Hilsa kelee</i> (Cuvier, 1829)*	Kelee Shad	MB	NE	CDA/140/2003	Mg, Ci, BC
Genus <i>Nematalosa</i> Regan 1917					
<i>Nematalosa nasus</i> (Bloch, 1795)*	Bloch's Gizzard Shad	BM	LC ^A	CDA/009/2001	Rs, Ci, BC
Genus <i>Sardinella</i> Valenciennes 1847					
<i>Sardinella fimbriata</i> (Valenciennes, 1847)**	Frimgescale Sardinella	MB	NE	CDA/010/2001	Mg,Ci
<i>Sardinella longiceps</i> (Valenciennes, 1847)**	Indian Oilsardine	M	LC ^A	CDA/011/2001	Mg,Ci
<i>Sardinella melanura</i> (Cuvier, 1829)	Blacktip Sardinella	M	NE		Mg
Genus <i>Tenuالosa</i> Fowler 1934					
<i>Tenuالosa ilisha</i> (Hamilton, 1822)*	Hilsa Shad	MB	VU ^{NBFG,R,B}	CDA/012/2001	Mg,Ci, Hvt
<i>Tenuالosa toli</i> (Valenciennes, 1847)**	Toli Shad	MBF	NE	CDA/203/2008	Mg,Ci
Family Engraulidae (Anchovies)					
Genus <i>Setipinna</i> Swainson 1839					
<i>Setipinna phasa</i> (Hamilton, 1822)	Gangetic Hairfin Anchovy	FB	LC ^A		Rs, BC
Genus <i>Stolephorus</i> Lacepède 1803					
<i>Stolephorus baganensis</i> Hardenberg, 1933*	Bagan Anchovy	BM	NE	CDA/080/2002	Mg

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Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
<i>Stolephorus commersonnii</i> Lacepede, 1803*	Commerson's Anchovy	BM	NE	CDA/081/2002	Mg,Ci
<i>Stolephorus dubiosus</i> Wongratana, 1983*	Thai Anchovy	BM	NE	CDA/082/2002	Mg
<i>Stolephorus indicus</i> (Van Hasselt, 1823)*	Indian Anchovy	BM	NE	CDA/013/2001	Rs, BC
Genus <i>Thryssa</i> Jorda, Seale 1925					
<i>Thryssa gautamiensis</i> Babu Rao, 1971**	Gautama Thryssa	BM	DD ^A	CDA/083/2002	Mg
<i>Thryssa hamiltonii</i> Gray, 1835*	Hamilton's Thryssa	BM	NE	CDA/084/2002	Mg
<i>Thryssa kammalensis</i> Wongratana, 1983	Godavari Thryssa	B	NE		Rs,BC
<i>Thryssa malabarica</i> (Bloch, 1795)*	Malabar Thryssa	BM	NE	CDA/085/2002	Mg
<i>Thryssa mystax</i> (Bloch, Schneider, 1801)*	Moustached Thryssa	BM	LC ^A	CDA/086/2002	Mg
<i>Thryssa polybranchialis</i> Wongratana, 1983*	Humphead Thryssa	M	NE	CDA/014/2001	Rs, BC
<i>Thryssa purava</i> (Hamilton, 1822)*	Oblique-jaw Thryssa	BM	NE	CDA/015/2001	Mg, BC
<i>Thryssa setirostris</i> (Broussonet, 1782)**	Long-jaw Thryssa	BM	NE	CDA/087/2002	Mg
<i>Thryssa vitrirostris</i> (Gilchrist, Thompson, 1908)**	Orangemouth Anchovy	BM	NE	CDA/204/2008	Mg
Family Chirocentridae (Wolf herrings)					
Genus <i>Chirocentrus</i> Cuvier 1816					
<i>Chirocentrus dorab</i> (Forsskal, 1775)	Dorab Wolf-herring	MB	NE		Mg
Family Pristigasteridae (Pellonas)					
Genus <i>Ilisha</i> Richardson 1846					
<i>Ilisha elongata</i> (Anonymous [Bennett], 1830)**	Elongate Ilisha	BM	NE	CDA/088/2002	Mg,Ci
<i>Ilisha megaloptera</i> (Swainson, 1839)*	Big Eye Ilisha	MBF	EN ^{NBFG} R	CDA/016/2001	Mg, Ci, BC
<i>Ilisha melastoma</i> (Bloch, Schneider, 1801)	Indian Ilisha	BM	NE		Mg
Genus <i>Opisthopterus</i> Gill 1861					
<i>Opisthopterus tardoore</i> (Cuvier, 1829)**	Tardoore	BM	NE	CDA/205/2008	Mg
Order Gonorynchiformes					
Family Chanidae (Milkfish)					
Genus <i>Chanos</i> Lacepède 1803					
<i>Chanos chanos</i> (Forsskal, 1775)*	Milkfish	MB	NE	CDA/017/2001	Mg,Ci
Order Cypriniformes					
Family Cyprinidae (Carp, minnows)					
Genus <i>Amblypharyngodon</i> Bleeker 1860					
<i>Amblypharyngodon mola</i> (Hamilton, 1822)*	Mola Carplet	F	LC ^A	CDA/231/2009	Mg,Ci,Or
Genus <i>Bangana</i> Hamilton 1822					
<i>Bangana ariza</i> (Hamilton, 1807)	Reba	F	LC ^A		Mg, Ci
Genus <i>Chela</i> (Hamilton 1822)					
<i>Chela cachius</i> (Hamilton, 1822)*	Silver Hatchet Chela	F	LC ^A	CDA/184/2006	Rs,Or
Genus <i>Cirrhinus</i> (Oken 1817)					
<i>Cirrhinus mrigala</i> (Hamilton, 1822)*	Mrigal Carp (Indian ajorcarp)	F	LC ^A	CDA/163/2004	Mg,Ci
<i>Cirrhinus reba</i> (Hamilton, 1822)*	Reba Carp	F	VU ^{CAMP}	CDA/237/2010	Mg,Ci,Or
Genus <i>Crossocheilus</i> Kuhl, van Hasselt 1823					
<i>Crossocheilus latius</i> (Hamilton, 1822)*	Stone Roller	F	VU ^{NBFG} R	CDA/089/2002	Rs,Or
Genus <i>Danio</i> Hamilton 1822					
<i>Danio rerio</i> (Hamilton, 1822)	Zebra Danio	F	LC ^A		Mg, Or, BC
Genus <i>Esomus</i> Swainson 1839					
<i>Esomus danricus</i> (Hamilton, 1822)*	Flying Barb	F	LC ^A	CDA/090/2002	Rs,Or,BC
Genus <i>Gibelion</i> Heekel 1843					
<i>Gibelion catla</i> (Hamilton, 1822)*	Catla	F	VU ^{CAMP}	CDA/162/2004	Mg,Ci
Genus <i>Labeo</i> Cuvier 1816					
<i>Labeo boga</i> (Hamilton, 1822)**	Boga Labeo	F	LC ^A	CDA/091/2002	Mg,Ci,Or
<i>Labeo calbasu</i> (Hamilton, 1822)*	Orangefin Labeo	F	LC ^A	CDA/243/2011	Mg,Ci,Or
<i>Labeo gonius</i> (Hamilton, 1822)**	Kuria Labeo	F	LC ^A	CDA/092/2002	Mg,Ci,Or
<i>Labeo rohita</i> (Hamilton, 1822)*	Roho Labeo	F	LC ^A	CDA/093/2002	Mg,Ci
Genus <i>Laubuka</i> Bleeker, 1860					
<i>Laubuka laubuca</i> (Hamilton, 1822)*	Indian Glass Barb	F	LC ^A	CDA/141/2003	Mg,Or
Genus <i>Osteobrama</i> Heckel 1843					
<i>Osteobrama peninsularis</i> Silas, 1952**	Peninsular Osteobrama	F	DD ^A	CDA/018/2001	Mg,Or
<i>Osteobrama vigorsii</i> (Sykes, 1839)	Godavari Osteobrama	F	LC ^A		Mg,Or
Genus <i>Pethia</i> Meegaskumbura, Maduwage 2012					
<i>Pethia ticto</i> (Hamilton, 1822)*	Ticto Barb	F	LC ^A	CDA/019/2001	Rs, Or, BC
Genus <i>Puntius</i> Hamilton 1822					
<i>Puntius chola</i> (Hamilton, 1822)*	Swamp Barb	F	LC ^A	CDA/020/2001	Rs,Or
<i>Puntius sophore</i> (Hamilton, 1822)*	Pool Barb	F	LC ^A	CDA/021/2001	Rs,Or
<i>Puntius vittatus</i> Day, 1865	Greenstripe Barb	F	LC ^A		Mg,Or
Genus <i>Rasbora</i> Bleeker 1859					
<i>Rasbora daniconius</i> (Hamilton, 1822)*	Slender Rasbora	F	LC ^A	CDA/094/2002	Mg,Or
<i>Rasbora rasbora</i> (Hamilton, 1822)*	Gangetic Scissortail Rasbora	F	LC ^A	CDA/095/2002	Mg,Or
Genus <i>Salmostoma</i> Swainson 1839					
<i>Salmostoma bacaila</i> (Hamilton, 1822)*	Large Razorbelly Minnow	F	LC ^A	CDA/096/2002	Mg,Or
Genus <i>Systemus</i> McClelland 1839					
<i>Systemus sarana</i> (Hamilton, 1822)*	Olive Barb	F	LC ^A	CDA/142/2003	Mg,Ci,Or
Family Cobitidae (Loaches)					
Genus <i>Lepidocephalichthys</i> Bleeker 1863					
<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	Guntea Loach	F	LC ^A		Mg,Or
Order Siluriformes					
Family Bagridae (Bagrid catfishes)					
Genus <i>Mystus</i> Scopoli 1777					
<i>Mystus cavasius</i> (Hamilton, 1822)*	Gangetic Mystus	FB	LC ^A	CDA/022/2001	Mg,Or

Continued

Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
<i>Mystus gulio</i> (Hamilton, 1822)*	Long Whiskers Catfish	BF	LC ^A	CDA/023/2001	Rs,Ci, Hvt,BC
<i>Mystus vittatus</i> (Bloch, 1794)*	Striped Dwarf Catfish	F	VU ^{CAMP,B}	CDA/194/2007	Mg,Or,BC
Genus <i>Sperata</i> Holly 1939					
<i>Sperata seenghala</i> (Sykes 1839)*	Giant River-catfish	FB	LC ^A	CDA/232/2009	Mg,Ci,Or
Family Siluridae (Eurasian catfishes)					
Genus <i>Ompok</i> Lacepède 1803					
<i>Ompok bimaculatus</i> (Bloch, 1794)*	Butter Catfish	F	EN ^{CAMP,B}	CDA/097/2002	Mg,Ci,Or
<i>Ompok pabda</i> (Hamilton, 1822)*	Pabdah Catfish	F	VU ^{NBFGR}	CDA/024/2001	Mg,Ci,Or
Genus <i>Wallago</i> Bleeker 1851					
<i>Wallago attu</i> (Bloch, Schneider, 1801)*	Wallago	F	NT ^A	CDA/025/2001	Mg,Ci
Family Schilbeidae (Schilbid catfishes)					
Genus <i>Ailia</i> Gray 1830					
<i>Ailia coila</i> (Hamilton, 1822)*	Gangetic Ailia	F	VU ^{CAMP,B}	CDA/098/2002	Mg,Ci
Genus <i>Eutropiichthys</i> Bleeker 1862					
<i>Eutropiichthys vacha</i> (Hamilton, 1822)	Batchwa Vacha	F	EN ^{CAMP,B}		Mg,Ci,Or
Genus <i>Silonia</i> Swainson 1838					
<i>Silonia silondia</i> (Hamilton, 1822)	Silond Catfish	F	VU ^{NBFGR}		Mg,Ci
Family Pangasiidae (Shark catfish)					
Genus <i>Pangasius</i> Valenciennes 1840					
<i>Pangasius pangasius</i> (Hamilton, 1822)*	Pangas Catfish, Yellowtail Catfish	F	VU ^{NBFGR,B}	CDA/026/2001	Mg,Or
Family Sisoridae (Sisorid catfish)					
Genus <i>Bagarius</i> Bleeker 1854					
<i>Bagarius bagarius</i> (Hamilton, 1822)*	Goonch	F	VU ^{NBFGR}	CDA/099/2002	Mg,Or
<i>Bagarius yarrelli</i> (Sykes, 1839)**	Goonch	F	EN ^{NBFGR}	CDA/100/2002	Mg,Ci,Or
Family Clariidae (Air-breathing catfish)					
Genus <i>Clarias</i> Scopoli 1777					
<i>Clarias magur</i> (Hamilton, 1822)*	Walking Catfish, Magur	F	EN ^A	CDA/195/2007	Mg,Ci,Or
Family Heteropneustidae (Airsac catfish)					
Genus <i>Heteropneustes</i> Müller 1840					
<i>Heteropneustes fossilis</i> (Bloch, 1794)*	Stinging Catfish	F	VU ^{NBFGR}	CDA/238/2010	Mg,Ci,Or
Family Ariidae (Sea catfish)					
Genus <i>Arius</i> Valenciennes 1840					
<i>Arius arius</i> (Hamilton, 1822)*	Threadfin Sea Catfish	B	LC ^A	CDA/027/2001	Mg, Ci
<i>Arius maculatus</i> (Thunberg, 1792)	Spotted Catfish	B	NE		Mg,Ci
Genus <i>Nemapteryx</i> Ogilby 1908					
<i>Nemapteryx caelata</i> (Valenciennes, 1840)*	Engraved Catfish	B	NE	CDA/206/2008	Mg, Ci, BC
Genus <i>Osteogeneiosus</i> Bleeker 1846					
<i>Osteogeneiosus militaris</i> (Linnaeus, 1758)*	Soldier Catfish	BM	NE	CDA/028/2001	Rs, Ci, BC
Genus <i>Plicofollis</i> Kailola 2004					
<i>Plicofollis layardi</i> (Günther, 1866)	Longsnouted Catfish	MB	NE		Mg,Ci
Family Plotosidae (Stinging catfishes)					
Genus <i>Plotosus</i> Lacepède 1803					
<i>Plotosus canius</i> Hamilton, 1822*	Gray Eel-catfish	B	NE	CDA/029/2001	Ci, Rs, BC
<i>Plotosus lineatus</i> (Thunberg, 1787)*	Striped Eel Catfish	B	NE	CDA/101/2002	Ci, Rs, Or, BC
Order Aulopiformes					
Family Synodontidae (Lizard fishes)					
Genus <i>Saurida</i> Valenciennes 1850					
<i>Saurida tumbil</i> (Bloch, 1795)**	Greater Lizardfish	M	NE	CDA/207/2008	Mg
Genus <i>Synodus</i> Scopoli 1777					
<i>Synodus myops</i> (Forster, 1801)**	Snakefish	MB	NE	CDA/102/2002	Mg
Order Mugiliformes					
Family Mugilidae (Mulletts)					
Genus <i>Ellochelon</i> Whitley 1930					
<i>Ellochelon vaigiensis</i> (Quoy, Gaimard, 1825)	Squaretail Mullet	BM	LC ^A		Mg,Ci,Or
Genus <i>Liza</i> Jordan, Swain 1884					
<i>Liza macrolepis</i> (Smith, 1846)*	Largescale Mullet	BM	LC ^A	CDA/126/2002	Mg,Ci, Hvt
<i>Liza melinopterus</i> (Valenciennes, 1836)*	Otomebora Mullet	BM	LC ^A	CDA/051/2001	Mg,Ci
<i>Liza parsia</i> (Hamilton, 1822)*	Goldspot Mullet	BM	NE	CDA/153/2003	Mg,Ci
<i>Liza subviridis</i> (Valenciennes, 1836)*	Greenback Mullet	MB	NE	CDA/127/2002	Mg, Ci, BC
<i>Liza tade</i> (Bloch, 1801)*	Tade Gray Mullet	MBF	DD ^A	CDA/171/2004	Mg,Ci
Genus <i>Moolgarda</i> Whitley 1945					
<i>Moolgarda cunnesius</i> (Valenciennes, 1836)*	Longarm Mullet	MB	NE	CDA/172/2004	Mg,Ci, Hvt,BC
<i>Moolgarda seheli</i> (Forsskal, 1775)*	Bluespot Mullet	MB	NE	CDA/052/2001	Mg,Ci
<i>Moolgarda speigleri</i> (Bleeker, 1858)*	Speigler's Mullet	MB	NE	CDA/055/2001	Mg,Ci
Genus <i>Mugil</i> Linnaeus 1758					
<i>Mugil cephalus</i> Linnaeus, 1758*	Flathead Gray Mullet	BM	LC ^A	CDA/053/2001	Mg,Ci, Hvt
Genus <i>Rhinomugil</i> Gill 1863					
<i>Rhinomugil corsula</i> (Hamilton, 1822)*	Corsula	BF	VU ^{NBFGR,B}	CDA/054/2001	Mg,Ci,Or,BC
Order Atheriniformes					
Family Atherinidae (Old World silversides)					
Genus <i>Atherinomorus</i> Fowler 1903					
<i>Atherinomorus duodecimalis</i> (Valenciennes, 1835)**	Tropical Silverside	BM	NE	CDA/030/2001	Mg
<i>Atherinomorus lacunosus</i> (Forster, 1801)**	Wide-banded Hardyhead Silverside	BM	NE	CDA/031/2001	Mg
Order Cyprinodontiformes					
Family Aplocheilidae (Asian revulines)					
Genus <i>Aplocheilus</i> McClelland 1839					

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Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
<i>Aplocheilus panchax</i> (Hamilton, 1822)*	Blue Panchax, Striped Panchax, Golden Wonder Killifish	FB	LC ^Δ	CDA/244/2011	Rs, Or, BC
Order Beloniformes					
Family Belonidae (Needle fishes)					
Genus <i>Strongylura</i> van Hasselt 1824					
<i>Strongylura leiura</i> (Bleeker, 1850)*	Banded Needlefish	B	NE	CDA/208/2008	Rs,Or
<i>Strongylura strongylura</i> (Van Hasselt, 1823)*	Spottail Needlefish	BF	NE	CDA/103/2002	Rs,Or, Hvt, BC
Genus <i>Xenentodon</i> Regan 1911					
<i>Xenentodon cancila</i> (Hamilton, 1822)*	Freshwater Garfish	FB	LC ^Δ	CDA/032/2001	Mg,Or
Family Hemiramphidae (Halfbeaks)					
Genus <i>Hemiramphus</i> Cuvier 1816					
<i>Hemiramphus far</i> (Forsskal, 1775)**	Black-barred Halfbeak	BM	NE	CDA/209/2008	Mg, Ci, BC
Genus <i>Hyporhamphus</i> Gill 1859					
<i>Hyporhamphus limbatus</i> (Valenciennes, 1847)*	Congaturi Halfbeak	BF	LC ^Δ	CDA/033/2001	Rs,Or, Hvt, BC
Family Adrianichthyidae (Adrianichthyids)					
Genus <i>Oryzias</i> Jordan, Snyder 1906					
<i>Oryzias dancena</i> (Hamilton, 1822)*	Estuarine Ricefish	BF	LC ^Δ	CDA/245/2011	Rs, Or, BC
Order Syngnathiformes					
Family Syngnathidae (Pipe fishes, Sea horses)					
Genus <i>Hippichthys</i> Bleeker 1849					
<i>Hippichthys cyanospilos</i> (Bleeker, 1854)**	Blue-spotted Pipefish	BF	NE	CDA/104/2002	Rs, Or, BC, NFF
Genus <i>Hippocampus</i> Rafinesque 1810					
<i>Hippocampus fuscus</i> Ruppell, 1838*	Sea Pony	B	VU ^B	CDA/164/2004	Rs, Or, BC, NFF
Genus <i>Ichthyocampus</i> Kaup 1853					
<i>Ichthyocampus carce</i> (Hamilton, 1822)*	Freshwater Pipefish	FB	LC ^Δ	CDA/143/2003	Rs, Or, BC, NFF
Order Synbranchiformes					
Family Synbranchidae (Swamp eels)					
Genus <i>Ophisternon</i> McClelland 1844					
<i>Ophisternon bengalense</i> McClelland, 1844**	Bengal Eel	FB	LC ^Δ	CDA/105/2002	Rs, BC
Family Mastacembelidae (Spiny eels)					
Genus <i>Macrogathus</i> Lacepède 1800					
<i>Macrogathus aral</i> (Bloch, Schneider, 1801)*	One-stripe Spinyeel	FB	LC ^Δ	CDA/239/2010	Ci, Rs, Or, BC
<i>Macrogathus pancalus</i> Hamilton, 1822*	Barred Spiny Eel	FB	LC ^Δ	CDA/240/2010	Ci, Rs, Or, BC
Genus <i>Mastacembelus</i> Scopoli 1777					
<i>Mastacembelus armatus</i> (Lacepede, 1800)*	Zig-zag Eel	FB	LC ^Δ	CDA/144/2003	Mg,Ci,Or
Order Scorpaeniformes					
Family Scorpaenidae (Scorpion fishes)					
Genus <i>Pterois</i> Oken 1817					
<i>Pterois radiata</i> Cuvier, 1829*	Radial Firefish	M	NE	CDA/106/2002	M,Mg,Or, NFF
Family Tetrarogidae (Waspfishes)					
Genus <i>Tetraroge</i> Günther 1860					
<i>Tetraroge niger</i> (Cuvier, 1829)**	Wasp Fish	M	LC ^Δ	CDA/145/2003	Mg, NFF
Family Platycephalidae (Flatheads)					
Genus <i>Cociella</i> Whitley 1940					
<i>Cociella crocodilus</i> (Cuvier, 1829)**	Crocodile Flathead	MB	NE	CDA/210/2008	Mg
Genus <i>Kumococius</i> Matsubara, Ochiai 1955					
<i>Kumococius rodericensis</i> (Cuvier, 1829)**	Spiny Flathead	M	NE	CDA/211/2008	Mg
Genus <i>Platycephalus</i> Bloch 1795					
<i>Platycephalus indicus</i> (Linnaeus, 1758)*	Bartail Flathead	BM	DD ^Δ	CDA/034/2001	Mg
Order Perciformes					
Family Ambassidae (Perchlets, glass fishes)					
Genus <i>Ambassis</i> Cuvier 1828					
<i>Ambassis ambassis</i> (Lacepede, 1802)*	Commerson's Glassy	BF	LC ^Δ	CDA/246/2011	Mg,Or
<i>Ambassis gymnocephalus</i> (Lacepede, 1802)*	Bald Glassy	BF	LC ^Δ	CDA/107/2002	Mg, Or, BC
Genus <i>Chanda</i> Hamilton 1822					
<i>Chanda nama</i> Hamilton, 1822*	Elongate Glass-perchlet	FB	LC ^Δ	CDA/035/2001	Mg,Or
Genus <i>Parambassis</i> Bleeker 1874					
<i>Parambassis ranga</i> (Hamilton, 1822)*	Indian Glassy Fish	FB	LC ^Δ	CDA/146/2003	Rs, Or, BC
Family Latidae (Lates perches/Asian Seabass)					
Genus <i>Lates</i> Cuvier 1828					
<i>Lates calcarifer</i> (Bloch, 1790)*	Barramundi	BF	VU ^P	CDA/036/2001	Mg,Ci, Hvt
Family Serranidae (Groupers, Rock-cods)					
Genus <i>Epinephelus</i> Bloch 1793					
<i>Epinephelus coioides</i> (Hamilton, 1822)**	Orange-spotted Grouper	MB	NT ^Δ	CDA/165/2004	Mg,Ci
<i>Epinephelus lanceolatus</i> (Bloch, 1790)	Giant Grouper	MB	VU ^{A,B}		Mg,Ci,Or
<i>Epinephelus malabaricus</i> (Bloch, Schneider, 1801)**	Malabar Grouper	MB	NT ^Δ	CDA/212/2008	Mg,Ci
<i>Epinephelus tauvina</i> (Forsskal, 1775)*	Greasy Grouper	M	DD ^Δ	CDA/213/2008	Mg,Ci
Family Sillaginidae (Smealt whittings)					
Genus <i>Sillaginopsis</i> Gill 1861					
<i>Sillaginopsis panijus</i> (Hamilton, 1822)	Flathead Sillago	MB	NE		Mg,Ci,Or
Genus <i>Sillago</i> Cuvier 1816					
<i>Sillago sihama</i> (Forsskal, 1775)*	Silver Sillago	B	NE	CDA/038/2001	Ci,Mg, Hvt
<i>Sillago vincenti</i> Mc Kay, 1980**	Vincent's Sillago	B	NE	CDA/109/2002	Mg,Ci
Family Lactariidae (False trevallies)					
Genus <i>Lactarius</i> Valenciennes 1833					
<i>Lactarius lactarius</i> (Bloch, Schneider, 1801)**	False Trevally	MB	NE	CDA/215/2008	Mg

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Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
Family Rachycentridae (Cobias)					
Genus <i>Rachycentron</i> Kaup 1826					
<i>Rachycentron canadum</i> (Linnaeus, 1766)*	Cobia	MB	NE	CDA/039/2001	Mg,Ci
Family Echeneidae (Sharksuckers, Discfishes)					
Genus <i>Echeneis</i> Linnaeus 1758					
<i>Echeneis naucrates</i> Linnaeus, 1758*	Live Sharksucker	MB	NE	CDA/147/2003	Mg,Or
Family Carangidae (Jacks, Trevallies, Pompanos, Scads)					
Genus <i>Alectis</i> Rafinesque 1815					
<i>Alectis indica</i> (Ruppell, 1830)*	Indian Threadfish	MB	NE	CDA/185/2006	Mg,Ci,Or
Genus <i>Alepes</i> Swainson 1839					
<i>Alepes djedaba</i> (Forsskal, 1775)*	Shrimp Scad	M	NE	CDA/110/2002	Mg,Ci
Genus <i>Atule</i> Jordan, Jordan 1922					
<i>Atule mate</i> (Cuvier, 1833)*	Yellowtail Scad	MB	NE	CDA/216/2008	Mg,Ci
Genus <i>Carangoides</i> Bleeker 1851					
<i>Carangoides gymnostethus</i> (Cuvier, 1833)	Bludger Trevally	M	NE		Mg,Ci
<i>Carangoides praeustus</i> (Anonymous [Bennett], 1830)*	Brownback Trevally	M	NE	CDA/175/2005	Mg
Genus <i>Caranx</i> Lacepède 1801					
<i>Caranx ignobilis</i> (Forsskal, 1775)	Giant Trevally	MB	NE		Mg,Or
<i>Caranx melampygus</i> Cuvier, 1833	Bluefin Trevally	MB	NE		Mg,Ci,Or
<i>Caranx sexfasciatus</i> Quoy, Gaimard, 1825*	Bigeye Trevally	MB	LC ^A	CDA/176/2005	Mg,Ci
Genus <i>Megalaspis</i> Bleeker 1851					
<i>Megalaspis cordyla</i> (Linnaeus, 1758)*	Torpedo Scad	M	NE	CDA/111/2002	Mg,Ci
Genus <i>Parastromateus</i> Bleeker 1864					
<i>Parastromateus niger</i> (Bloch, 1795)	Black Pomfret	MB	NE		Mg,Ci
Genus <i>Scomberoides</i> Lacepède 1801					
<i>Scomberoides commersonnianus</i> Lacepede, 1801**	Talang Queenfish	MB	NE	CDA/112/2002	Mg,Ci
<i>Scomberoides lysan</i> (Forsskal, 1775)	Doublespotted Queenfish	MB	NE		Mg,Ci
<i>Scomberoides tala</i> (Cuvier, 1832)*	Barred Queenfish	M	NE	CDA/113/2002	Mg,Ci
<i>Scomberoides tol</i> (Cuvier, 1832)**	Needlescaled Queenfish	MB	NE	CDA/114/2002	Mg,Ci
Genus <i>Selar</i> Bleeker 1851					
<i>Selar boops</i> (Cuvier, 1833)**	Oxeye Scad	M	NE	CDA/217/2008	Mg
<i>Selar crumenophthalmus</i> (Bloch, 1793)**	Bigeye Scad	M	NE	CDA/115/2002	Mg,Ci
Genus <i>Selaroides</i> Bleeker 1851					
<i>Selaroides leptolepis</i> (Cuvier, 1833)*	Yellowstripe Scad	MB	NE	CDA/116/2002	Mg,Ci
Genus <i>Trachinotus</i> Lacepède 1801					
<i>Trachinotus blochii</i> (Lacepede, 1801)	Snubnose Pompano	MB	NE		Mg,Or,BC
<i>Trachinotus mookalee</i> Cuvier, 1832**	Indian Pompano	M	NE	CDA/117/2002	Mg
Family Leiognathidae (Pony fishes, Silverbellies)					
Genus <i>Aurigequulla</i> Fowler 1918					
<i>Aurigequulla fasciatus</i> (Lacepede, 1803)**	Striped Ponyfish	MB	NE	CDA/166/2004	Mg
Genus <i>Deveximentum</i> Fowler, 1904					
<i>Deveximentum insidiator</i> (Bloch, 1787)*	Pugnose Ponyfish	M	NE	CDA/179/2005	Mg
<i>Deveximentum ruconius</i> (Hamilton, 1822)**	Deep Pugnose Ponyfish	M	NE	CDA/118/2002	Mg
Genus <i>Eubleekeria</i> Fowler 1904					
<i>Eubleekeria splendens</i> (Cuvier, 1829)	Splendid Ponyfish	M	LC ^A		Mg
Genus <i>Gazza</i> Rüppell 1835					
<i>Gazza minuta</i> (Bloch, 1795)*	Toothpony	M	LC ^A	CDA/186/2006	Mg
Genus <i>Karalla</i> Chakrabarty, Sparks 2008					
<i>Karalla daura</i> (Cuvier, 1829)	Goldstripe Ponyfish	M	NE		Mg
<i>Karalla dussumieri</i> (Valenciennes, 1835)*	Dussumier’s Ponyfish	M	NE	CDA/177/2005	Mg
Genus <i>Leiognathus</i> Lacepède 1802					
<i>Leiognathus equulus</i> (Forsskal, 1775)*	Common Ponyfish	MB	LC ^A	CDA/178/2005	Mg, BC
Genus <i>Nuchequula</i> Whitley 1932					
<i>Nuchequula blochii</i> (Valenciennes, 1835)*	Twoblotch Ponyfish	M	NE	CDA/148/2003	Mg
<i>Nuchequula gerreoides</i> (Bleeker, 1851)**	Decorated Ponyfish	MB	NE	CDA/149/2003	Mg
Genus <i>Photopectoralis</i> Sparks, Dunlap, Smith 2005					
<i>Photopectoralis bindus</i> (Valenciennes, 1835)**	Orangefin Ponyfish	M	NE	CDA/150/2003	Mg
Family Lutjanidae (Snappers)					
Genus <i>Lutjanus</i> Bloch 1790					
<i>Lutjanus argentimaculatus</i> (Forsskal, 1775)*	Mangrove Red Snapper	MBF	NE	CDA/040/2001	Mg,Ci
<i>Lutjanus indicus</i> Allen, White, Erdmann, 2013*	Indian Snapper	MB	NE	CDA/168/2004	Mg,Ci
<i>Lutjanus johnii</i> (Bloch, 1792)*	John’s Snapper	MB	NE	CDA/041/2001	Mg,Ci
<i>Lutjanus kasmira</i> (Forsskal, 1775)*	Common Bluestripe Snapper	M	NE	CDA/167/2004	Mg,Ci
Family Datnioididae (Freshwater triple tails)					
Genus <i>Datnioides</i> Bleeker 1853					
<i>Datnioides polota</i> (Hamilton, 1822)*	Four-banded Tigerfish	FB	LC ^A	CDA/042/2001	Ci,Rs,Or,BC
Family Gerreidae (Silver biddies)					
Genus <i>Gerres</i> Quoy, Gaimard 1824					
<i>Gerres erythrourus</i> (Bloch, 1791)**	Deep-bodied Mojarra	MB	NE	CDA/180/2005	Mg,Ci
<i>Gerres filamentosus</i> Cuvier, 1829*	Whipfin Silver-biddy	MB	LC ^A	CDA/181/2005	Mg
<i>Gerres limbatus</i> Cuvier, 1830*	Saddleback Silver-biddy	MB	NE	CDA/169/2004	Mg
<i>Gerres macracanthus</i> Bleeker, 1854	Longspine Silverbiddy	MB	NE		Mg
<i>Gerres oyena</i> (Forsskal, 1775)*	Common Silver-biddy	MB	NE	CDA/043/2001	Mg
<i>Gerres phaiya</i> Iwatsuki, Heemstra, 2001*	Strongspine Silver-Biddy	MB	NE	CDA/233/2009	Mg
<i>Gerres setifer</i> (Hamilton, 1822)*	Small Bengal Silver-biddy	MB	NE	CDA/044/2001	Mg, BC

Continued

Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
Family Haemulidae (Grunts, Rubberlips)					
Genus <i>Plectorhinchus</i> Lacepède 1801					
<i>Plectorhinchus gibbosus</i> (Lacepède, 1802)	Harry Hotlips	M	LC ^A		Mg
Genus <i>Pomadasys</i> Lacepède 1802					
<i>Pomadasys argenteus</i> (Forsskal, 1775)*	Silver Grunt	MB	VU ^B	CDA/119/2002	Mg,Ci
<i>Pomadasys kaakan</i> (Cuvier, 1830)**	Javelin Grunter	MB	NE	CDA/120/2002	Mg,Ci
<i>Pomadasys multimaculatus</i> (Playfair, 1867)**	Cock Grunter	MB	NE	CDA/170/2004	Mg,Ci
Family Sparidae (Seabreams)					
Genus <i>Acanthopagrus</i> Peters 1855					
<i>Acanthopagrus berda</i> (Forsskal, 1775)*	Goldsilk Seabream	MB	NE	CDA/151/2003	Mg,Ci,Or
<i>Acanthopagrus longispinnis</i> Valenciennes, 1830	Bengal Yellowfin Seabream	MB	NE		Mg,Ci
Genus <i>Argyrops</i> Swainson 1839					
<i>Argyrops spinifer</i> (Forsskal, 1775)	King Soldier Bream	M	NE		Mg,Ci
Genus <i>Crenidens</i> Valenciennes 1830					
<i>Crenidens crenidens</i> (Forsskal, 1775)*	Karanteen Seabream	M	NE	CDA/045/2001	Mg,Ci
Genus <i>Rhabdosargus</i> Fowler 1933					
<i>Rhabdosargus sarba</i> (Forsskal, 1775)*	Goldlined Seabream	MB	NE	CDA/046/2001	Mg,Ci
Family Nemipteridae (Threadfin breams)					
Genus <i>Nemipterus</i> Swainson 1839					
<i>Nemipterus japonicus</i> (Bloch, 1791)**	Japanese Threadfin Bream	M	NE	CDA/218/2008	Mg
Family Sciaenidae (Croakers)					
Genus <i>Daysciaena</i> Talwar 1970					
<i>Daysciaena albida</i> (Cuvier, 1830)*	Bengal Corvina	MB	NE	CDA/047/2001	Mg,Ci, Hvt,BC
Genus <i>Dendrophysa</i> Trewavas 1964					
<i>Dendrophysa russelii</i> (Cuvier, 1829)*	Goatee Croaker	MFB	NE	CDA/048/2001	Rs, BC
Genus <i>Johnius</i> Bloch 1793					
<i>Johnius amblycephalus</i> (Bleeker, 1855)	Bearded Croaker	MBF	NE		Mg
<i>Johnius belangerii</i> (Cuvier, 1830)*	Belanger’s Croaker	MB	NE	CDA/121/2002	Mg
<i>Johnius carutta</i> Bloch, 1793**	Karut Croaker	BM	NE	CDA/219/2008	Mg
<i>Johnius coitor</i> (Hamilton, 1822)	Coitor Croaker	BM	LC ^A		Mg
<i>Johnius dussumieri</i> (Cuvier, 1830)	Sin Croaker	MB	NE		Mg
<i>Johnius macropterus</i> (Bleeker, 1853)*	Largefin Croaker	M	NE	CDA/220/2008	Mg
Genus <i>Nibea</i> Jordan, Thompson 1911					
<i>Nibea maculata</i> (Bloch, Schneider, 1801)**	Blotched Croaker	M	NE	CDA/221/2008	Mg
Genus <i>Otolithes</i> Oken 1817					
<i>Otolithes ruber</i> (Bloch, Schneider, 1801)**	Tigertooth Croaker	MB	NE	CDA/222/2008	Mg
Genus <i>Otolithoides</i> Fowler 1933					
<i>Otolithoides biauritus</i> (Cantor, 1849)	Bronze Croaker	M	VU ^{M,B}		Mg,Ci
<i>Otolithoides pama</i> (Hamilton, 1822)*	Pama Croaker	BM	NE	CDA/223/2008	Mg,Ci
Genus <i>Paranibea</i> Trewavas 1977					
<i>Paranibea semiluctuosa</i> (Cuvier, 1830)*	Half-mourning Croaker	M	NE	CDA/122/2002	Mg
Genus <i>Protonibea</i> Trewavas 1971					
<i>Protonibea diacanthus</i> (Lacepede, 1802)*	Blackspotted Croaker	MB	VU ^{M,B}	CDA/123/2002	Mg,Ci
Family Polynemidae (Threadfin fishes)					
Genus <i>Eleutheronema</i> Bleeker 1862					
<i>Eleutheronema tetradactylum</i> (Shaw, 1804)*	Fourfinger Threadfin	MBF	NE	CDA/049/2001	Mg,Ci, Hvt,BC
Genus <i>Leptomelanosoma</i> Motomura, Iwatsuki 2001					
<i>Leptomelanosoma indicum</i> (Shaw, 1804)*	Indian Threadfin	MB	VU ^{M,B}	CDA/187/2006	Mg,Ci
Genus <i>Polydactylus</i> Lacepède 1803					
<i>Polydactylus plebeius</i> (Broussonet, 1782)**	Striped Threadfin	MB	NE	CDA/152/2003	Mg,Ci
<i>Polydactylus sextarius</i> (Bloch, Schneider, 1801)*	Blackspot Threadfin	MB	NE	CDA/124/2002	Mg
Family Mullidae (Goatfishes)					
Genus <i>Upeneus</i> Cuvier 1829					
<i>Upeneus sulphureus</i> Cuvier, 1829**	Sulphur Goatfish	MB	NE	CDA/224/2008	Mg,Or
Family Drepaneidae (Sicklefishes)					
Genus <i>Drepane</i> Cuvier 1831					
<i>Drepane punctata</i> (Linnaeus, 1758)*	Spotted Sicklefish	M	NE	CDA/125/2002	Mg,Ci, Or
Family Monodactylidae (Moonies)					
Genus <i>Monodactylus</i> Lacepède 1801					
<i>Monodactylus argenteus</i> (Linnaeus, 1758)*	Silver Moony	MB	NE	CDA/248/2012	Mg,Or
<i>Monodactylus kottelati</i> Pethiyagoda, 1991**	Silver Moony	MB	NE	ZSI/MARC/F-2517/2014	Mg,Or
Family Nandidae (Leaf fishes)					
Genus <i>Nandus</i> Valenciennes 1831					
<i>Nandus nandus</i> (Hamilton, 1822)*	Gangetic Leaffish	FB	LC ^A	CDA/050/2001	Mg,Ci,Or
Family Terapontidae (Terapon perches)					
Genus <i>Pelates</i> Cuvier 1829					
<i>Pelates quadrilineatus</i> (Bloch, 1790)	Fourlined Terapon	BM	NE		Mg,Or
Genus <i>Terapon</i> Cuvier 1816					
<i>Terapon jarbua</i> (Forsskål, 1775)*	Jarbua Terapon	BM	LC ^A	CDA/037/2001	Mg,Or
<i>Terapon puta</i> Cuvier, 1829*	Small-scaled Terapon	BM	NE	CDA/108/2002	Rs,Or,BC
<i>Terapon theraps</i> Cuvier, 1829*	Largescaled Terapon	BM	LC ^A	CDA/214/2008	Mg,Or
Family Cichlidae (Cichlids)					
Genus <i>Etroplus</i> Cuvier 1830					
<i>Etroplus suratensis</i> (Bloch, 1790)*	Pearlspot	BF	LC ^A	CDA/056/2001	Rs,Ci,Or, Hvt,BC
Genus <i>Oreochromis</i> Günther 1889					
<i>Oreochromis mossambicus</i> (Peters, 1852)**	Mozambique Tilapia	FB	NT ^A	CDA/057/2001	Rs, Or, BC

Continued

Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
Family Uranoscopidae (Stargazers)					
Genus <i>Ichthyoscopus</i> Swainson 1839					
<i>Ichthyoscopus lebeck</i> (Bloch, Schneider, 1801)*	Longnosed Stargazer	M	NE	CDA/128/2002	Mg, NFF
Family Blenniidae (Blennies, allies)					
Genus <i>Omobranchus</i> Valenciennes 1836					
<i>Omobranchus zebra</i> (Bleeker, 1868)*	Zebra Blenny	MB	NE	CDA/253/2013	Mg, BC, NFF
Family Eleotridae (Gudgeons)					
Genus <i>Butis</i> Bleeker 1856					
<i>Butis butis</i> (Hamilton, 1822)	Duckbill Sleeper	BM	LC ^A		Mg,Or
Genus <i>Eleotris</i> Bloch, Schneider 1801					
<i>Eleotris fusca</i> (Forster, 1801)	Dusky Sleeper	BF	LC ^A		Mg,Or
<i>Eleotris melanosoma</i> Bleeker, 1853**	Broadhead Sleeper	BF	LC ^A	CDA/154/2003	Rs, BC
Family Gobiidae (Gobies)					
Genus <i>Acentrogobius</i> Bleeker 1874					
<i>Acentrogobius cyanomos</i> (Bleeker, 1849)*		BM	NE	CDA/058/2001	Rs,BC, NFF
<i>Acentrogobius griseus</i> (Day, 1876)	Grey Goby	BF	NE		Or, Mg, end, NFF
<i>Acentrogobius masoni</i> (Day, 1873)	Mason's Goby	BF	NE		Mg, NFF
<i>Acentrogobius viridipunctatus</i> (Valenciennes, 1837)	Spotted Green Goby	BF	NE		Or, Mg, NFF
<i>Acentrogobius madraspatensis</i> (Day, 1868)	Manyband Goby	BM	NE		Mg, NFF
Genus <i>Bathygobius</i> Bleeker 1878					
<i>Bathygobius fuscus</i> (Ruppell, 1830)	Dusky Frillgoby	BM	LC ^A		Mg,Or, NFF
<i>Bathygobius ostreicola</i> (Chaudhuri, 1916)		B	DD ^A		Mg, end, NFF
Genus <i>Brachygobius</i> Bleeker 1874					
<i>Brachygobius nunus</i> (Hamilton, 1822)	Bumblebee Goby	BF	NE		Rs, NFF
Genus <i>Drombus</i> Jordan, Seale 1905					
<i>Drombus globiceps</i> (Hora, 1923)*	Kranji Drombus	BF	LC ^A	CDA/129/2002	Mg, NFF
Genus <i>Glossogobius</i> Gill 1859					
<i>Glossogobius giuris</i> (Hamilton, 1822)*	Tank Goby	FB	LC ^A	CDA/173/2004	Mg,Or, BC
Genus <i>Gobiopterus</i> Bleeker 1874					
<i>Gobiopterus chuno</i> (Hamilton, 1822)	Transparent Goby	BF	DD ^A		Rs,Or, BC, NFF
Genus <i>Oligolepis</i> Bleeker 1874					
<i>Oligolepis acutipennis</i> (Valenciennes, 1837)	Sharptail Goby	MB	DD ^A		Mg,Or, NFF
<i>Oligolepis cylindriceps</i> (Hora, 1923)*		B	NE	CDA/249/2012	Rs, BC, NFF
Genus <i>Oxyurichthys</i> Bleeker 1857					
<i>Oxyurichthys microlepis</i> (Bleeker, 1849)*	Maned Goby	MB	NE	CDA/196/2007	Mg,Or, NFF
<i>Oxyurichthys tentacularis</i> (Valenciennes, 1837)*	Tentacled Goby	MB	NE	CDA/130/2002	Mg,Or, NFF
Genus <i>Parapocryptes</i> Bleeker 1857					
<i>Parapocryptes rictuosus</i> (Valenciennes, 1837)		MB	NE		Mg, NFF
Genus <i>Periophthalmus</i> Bloch, Schneider 1801					
<i>Periophthalmus kalolo</i> Lesson, 1831*	Common Mudskipper	BM	NE	CDA/197/2007	Mg,Or
Genus <i>Psammogobius</i> Smith 1935					
<i>Psammogobius biocellatus</i> (Valenciennes, 1837)*	Sleepy Goby	MB	LC ^A	CDA/131/2002	Rs, BC, NFF
Genus <i>Pseudapocryptes</i> Bleeker 1874					
<i>Pseudapocryptes elongatus</i> (Cuvier, 1816)		BF	LC ^A		Mg
Genus <i>Pseudogobiopsis</i> Koumans 1935					
<i>Pseudogobiopsis oligactis</i> (Bleeker, 1875)		B	LC ^A		Mg, NFF
Genus <i>Pseudogobius</i> Popta 1922					
<i>Pseudogobius javanicus</i> (Bleeker, 1856)	Javaness Goby	BF	NE		Mg,Or, NFF
Genus <i>Stigmatogobius</i> Bleeker 1874					
<i>Stigmatogobius minima</i> (Hora, 1923)	Minima Goby	B	NE		Rs,Or,BC, NFF
Genus <i>Taenioides</i> Lacepède 1800					
<i>Taenioides buchanani</i> (Day, 1873)	Burmese Gobyeel	BF	NE		Mg, NFF
Genus <i>Trypauchen</i> Valenciennes 1837					
<i>Trypauchen vagina</i> (Bloch, Schneider, 1801)*	Burrowing Goby	MB	NE	CDA/155/2003	Mg, NFF
Genus <i>Yongeichthys</i> Whitley 1932					
<i>Yongeichthys nebulosus</i> (Forsskal, 1775)**	Shadow Goby	MB	NE	CDA/132/2002	Mg, NFF
Family Ephippidae (Spadefishes)					
Genus <i>Ephippus</i> Cuvier 1816					
<i>Ephippus orbis</i> (Bloch, 1787)**	Orbfish	M	NE	CDA/225/2008	Mg
Genus <i>Platax</i> Cuvier 1816					
<i>Platax orbicularis</i> (Forsskal, 1775)**	Orbicular Batfish	MB	NE	CDA/250/2012	Mg,Or
Family Scatophagidae (Scats)					
Genus <i>Scatophagus</i> Cuvier 1831					
<i>Scatophagus argus</i> (Linnaeus, 1766)*	Spotted Scat	BF	LC ^A	CDA/059/2001	Mg,Or
Family Siganidae (Spinsfoots, Rabbitfishes)					
Genus <i>Siganus</i> Forsskål 1775					
<i>Siganus canaliculatus</i> (Park, 1797)**	White-spotted Spinefoot	MB	NE	CDA/226/2008	Mg,Or
<i>Siganus javus</i> (Linnaeus, 1766)*	Streaked Spinefoot	MB	NE	CDA/133/2002	Mg,Or
<i>Siganus vermiculatus</i> (Valenciennes, 1835)*	Vermiculated Spinefoot	MB	LC ^A	CDA/227/2008	Mg,Or
Family Acanthuridae (Surgeon fishes)					
Genus <i>Acanthurus</i> Forsskål 1775					
<i>Acanthurus mata</i> (Cuvier, 1829)**	Elongate Surgeonfish	M	LC ^A	CDA/198/2007	Mg,Or
<i>Acanthurus triostegus</i> (Linnaeus, 1758)**	Convict Surgeonfish	M	LC ^A	MARC/ZSI/F2516/2013	Mg, Or
Family Sphyrnidae (Barracudas)					
Genus <i>Sphyrna</i> Artedi 1793					
<i>Sphyrna jello</i> Cuvier, 1829**	Pickhandle Barracuda	M	NE	CDA/156/2003	Mg,Ci

Continued

Table 1. Continued.

Taxon	Common Name	Habitat	Conservation Status	Voucher	Faunal characteristics
<i>Sphyraena putnamae</i> Jordan, Seale, 1905**	Sawtooth Barracuda	M	NE	CDA/157/2003	Mg,Ci
Family Trichiuridae (Hairtail fishes)					
Genus <i>Eupleurogrammus</i> Gill 1862					
<i>Eupleurogrammus glossodon</i> (Bleeker, 1860)**	Longtooth Hairtail	M	NE	CDA/158/2003	Mg,Ci
Genus <i>Lepturacanthus</i> Fowler 1905					
<i>Lepturacanthus savala</i> (Cuvier, 1829)**	Savalai Hairtail	MB	NE	CDA/160/2003	Mg,Ci
Genus <i>Trichiurus</i> Linnaeus 1758					
<i>Trichiurus lepturus</i> Linnaeus, 1758**	Largehead Hairtail	MB	NE	CDA/159/2003	Mg,Ci
Family Scombridae (Mackerels, Seerfishes, Tunas, Albacores)					
Genus <i>Euthynnus</i> Lütken 1883					
<i>Euthynnus affinis</i> (Cantor, 1849)**	Kawakawa	M	LC ^Δ	CDA/134/2002	Mg,Ci
Genus <i>Rastrelliger</i> Jordan, Starks 1908					
<i>Rastrelliger kanagurta</i> (Cuvier, 1816)**	Indian Mackerel	M	DD ^Δ	CDA/060/2001	Mg,Ci
Genus <i>Scomberomorus</i> Lacepède 1801					
<i>Scomberomorus lineolatus</i> (Cuvier, 1829)*	Streaked Seerfish	M	LC ^Δ	CDA/135/2002	Mg,Ci
Family Anabantidae (Climbing perches)					
Genus <i>Anabas</i> Cloquet 1816					
<i>Anabas cobojius</i> (Hamilton, 1822)*	Gangetic Koi	F	DD ^Δ	CDA/061/2001	Mg,Ci,Or
<i>Anabas testudineus</i> (Bloch, 1792)*	Climbing Perch	FB	DD ^Δ	CDA/062/2001	Mg,Ci,Or
Family Osphronemidae (Gouramies)					
Genus <i>Trichogaster</i> Bloch, Schneider 1801					
<i>Trichogaster fasciata</i> Bloch, Schneider, 1801*	Banded Gourami	FB	LC ^Δ	CDA/063/2001	Mg,Or
<i>Trichogaster lalius</i> (Hamilton, 1822)*	Dwarf Gourami	F	LC ^Δ	CDA/064/2001	Mg,Or
Family Channidae (Snakeheads, Murrels)					
Genus <i>Channa</i> Scopoli 1777					
<i>Channa gachua</i> (Hamilton, 1822)**	Pigmy Snakehead	F	LC ^Δ	CDA/241/2010	Mg, Or, BC
<i>Channa marulius</i> (Hamilton, 1822)**	Great Snakehead	F	LC ^Δ	CDA/234/2009	Mg,Ci,Or
<i>Channa punctata</i> (Bloch, 1793)*	Spotted Snakehead	F	LC ^Δ	CDA/065/2001	Ci, Rs, Or, BC
<i>Channa striata</i> (Bloch, 1793)*	Striped Snakehead	FB	LC ^Δ	CDA/066/2001	Ci,Rs,Or, Hvt,BC
Order Pleuronectiformes					
Family Paralichthyidae (Lefteye flounders)					
Genus <i>Pseudorhombus</i> Bleeker 1862					
<i>Pseudorhombus arsius</i> (Hamilton, 1822)*	Largetooth Flounder	MB	NE	CDA/136/2002	Mg,Ci
<i>Pseudorhombus micrognathus</i> Norman, 1927**	Flat Fish	M	NE	CDA/137/2002	Mg
<i>Pseudorhombus triocellatus</i> (Bloch, Schneider, 1801)**	Three-spotted Flounder	M	NE	CDA/138/2002	Mg,Ci,Or
Family Soleidae (Soles)					
Genus <i>Brachirus</i> Swainson 1839					
<i>Brachirus orientalis</i> (Bloch, Schneider, 1801)*	Oriental Sole	MBF	NE	CDA/199/2007	Mg,Ci
Genus <i>Solea</i> Quensel 1806					
<i>Solea ovata</i> Richardson, 1846*	Ovate Sole	M	NE	CDA/182/2005	Mg
Family Cynoglossidae (Tongue soles)					
Genus <i>Cynoglossus</i> Hamilton 1822					
<i>Cynoglossus lida</i> (Bleeker, 1851)**	Roughscale Tonguesole	M	NE	CDA/228/2008	Mg
<i>Cynoglossus lingua</i> Hamilton, 1822*	Long Tongue Sole	MB	NE	CDA/200/2007	Mg
<i>Cynoglossus puncticeps</i> (Richardson, 1846)*	Speckled Tonguesole	MB	NE	CDA/189/2006	Mg
Order Tetraodontiformes					
Family Triacanthidae (Tripod fishes)					
Genus <i>Triacanthus</i> Oken 1817					
<i>Triacanthus biaculeatus</i> (Bloch, 1786)*	Short-nosed Tripodfish	BM	NE	CDA/067/2001	Rs, BC
Family Balistidae (Triggerfishes)					
Genus <i>Abalistes</i> Jordan, Seale 1906					
<i>Abalistes stellaris</i> (Bloch, Schneider, 1801)**	Starry Triggerfish	M	NE	CDA/247/2011	Mg,Or
Family Tetraodontidae (Puffers)					
Genus <i>Arothron</i> Müller 1841					
<i>Arothron reticularis</i> (Bloch, Schneider, 1801)	Reticulated Pufferfish	MB	NE		Mg,Or, NFF
<i>Arothron stellatus</i> (Anonymous, 1798)	Stellate Puffer	MB	NE		Mg,Or, NFF
Genus <i>Chelonodontops</i> Smith, 1958					
<i>Chelonodontops patoca</i> (Hamilton, 1822)*	Milkspotted Puffer	MB	NE	CDA/190/2006	Mg, NFF
Genus <i>Dichotomyctere</i> Dumèril, 1855					
<i>Dichotomyctere fluviatilis</i> (Hamilton, 1822)*	Green Pufferfish	FB	NE	CDA/193/2006	Rs,Or, NFF
Genus <i>Gastrophysus</i> Muller, 1843					
<i>Gastrophysus oblongus</i> (Bloch, 1786)*	Lattice Blaasop	MB	NE	CDA/191/2006	Mg, NFF
Genus <i>Lagocephalus</i> Swainson 1839					
<i>Lagocephalus lunaris</i> (Bloch, Schneider, 1801)	Lunartail Puffer	MB	NE		Mg,Or, NFF
Genus <i>Leiodon</i> Swainson, 1839					
<i>Leiodon cutcutia</i> (Hamilton, 1822)*	Ocellated Pufferfish	BF	LC ^Δ	CDA/192/2006	Mg,Or, NFF
Family Diodontidae (Porcupinefishes)					
Genus <i>Diodon</i> Linnaeus 1758					
<i>Diodon hystrix</i> Linnaeus, 1758**	Spot-fin Porcupinefish	M	NE	CDA/251/2012	Mg,Or, NFF

**New records during post-restoration period; *Post-restoration inventory; Δ IUCN Red List Status; CAMP Report 1998; P Pooniah (1993); NBFGR National Bureau of Fish Genetic Resources (2010); CE/CR-Critically Endangered; VU-Vulnerable; NT-Near Threatened; LC-List Concern; DD-Data Deficient; M Menon (2004); B Barman et al. (2007) NE-Not Evaluated; EN/E- Endangered; MBF- Marine, Brackish water, Freshwater; BM- Brackish water, Marine ; MB- Marine, Brackish ; M- Marine ; F- Fresh water ; FB- Fresh water, Brackish water; B- Brackish water; CAMP-Conservation Assessment and Management Plan Workshops (1998), Mg-Migratory, Ci-Commercially important, Or-Ornamental fish, Hvc-High value commercial fish, Rs-Resident species, end-Endemic, Hvt-High value target species BC- Breeding in Chilika, NFF- Not Food Fish.

retrieval. The higher ichthyofaunal inventory made during the post-restoration period may be attributed to a number of interventions, including the opening of a new artificial lake mouth nearer to the main water body of the lake (11 km from Magarmukh), desiltation of 14 km long Palur canal restoring the connectivity with the sea through the mouth of Rusikulya River, dredging of a 27 km long new channel connecting Magarmukh and the river confluence point in the northern sector, and desiltation of the lead channel between Magarmukh and the lake mouth (Figure 3). The hydrological intervention in 2000 increased the tidal flux by 44% and salinity level in the lake by 35% as compared to the pre-restoration period (Table 3). Because salinity dynamics are the main driving force enhancing fisheries in general and fish diversity in particular, the enhancement of ichthyofaunal diversity recorded during post-restoration period was likely

Table 2. Number of families, genera and species, and total for each taxonomic category.

Order	Family	Genus	Species
Orectolobiformes	1	1	1
Carcharhiniformes	2	5	7
Pristiiformes	1	1	1
Rajiformes	1	1	1
Myliobatiformes	2	4	8
Osteoglossiformes	1	2	2
Elopiformes	2	2	2
Anguilliformes	4	6	9
Clupeiformes	5	18	36
Gonorynchiformes	1	1	1
Cypriniformes	2	17	25
Siluriformes	9	16	22
Aulopiformes	1	2	2
Mugiliformes	1	5	11
Atheriniformes	1	1	2
Cyprinodontiformes	1	1	1
Beloniformes	3	5	6
Syngnathiformes	1	3	3
Synbranchiformes	2	3	4
Scorpaeniformes	3	5	5
Perciformes	37	95	150
Pleuronectiformes	3	4	8
Tetraodontiformes	4	9	10
23	88	207	317

mainly attributable to it. In general, opening of the new lake mouth in the year 2000 showed positive impact on the lake fisheries due to improvement in overall water quality (Mohanty et al. 2009). Recruitment success, effective seaward migration of catadromous fishes and restoration of degraded habitats being facilitated by hydrological intervention also likely helped enhance ichthyofaunal diversity. The entire scenario changed during the eco-restoration period with positive effects. The freshwater fish fauna of the Mahanadi River system was reflected in the freshwater fish fauna of Chilika Lake as the tributaries of Mahanadi River drain into it.

The families and species numbers in each order is depicted in (Figure 4), indicating that Perciformes is numerically the largest with 150 (47.32%) species followed by Clupeiformes with 36 (11.36%) species, Cypriniformes with 25 (7.89%) species and Siluriformes with 23 (7.25%) species. Pristiiformes, Rajiformes, Gonorynchiformes, Orectolobiformes, and Cyprinodontiformes were represented by single species only (Figure 4).

In total, 15 families (Balistidae, Diodontidae, Acanthuridae, Ephippidae, Mullidae, Nemipteridae, Lactariidae, Tetraogridae, Synbranchidae, Atherinidae,

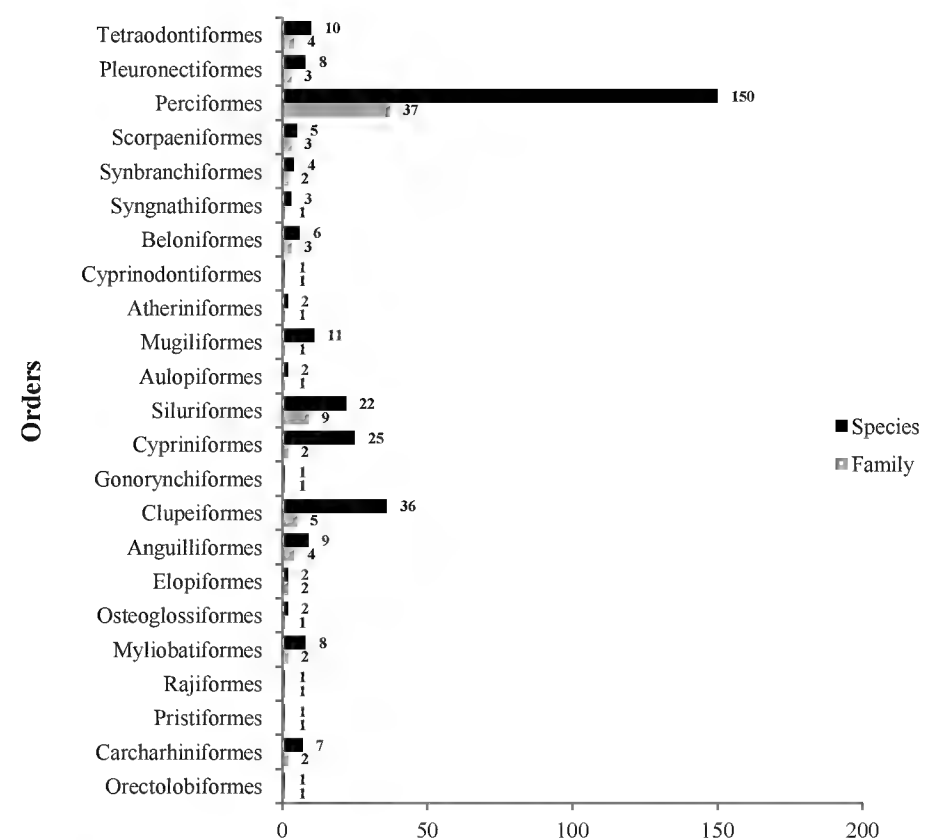


Figure 4. Orders, families and species numbers for ichthyofaunal components of Chilika Lake.

Table 3. Variation in average water quality parameters in Chilika Lake during pre and post restoration periods.

Water quality parameter	Pre-restoration (1999–2000)	Post-restoration (pooled average for 13 years) 2001–02 to 2013–14	Percentage variation
Water Temperature (°C)	28.1	28.56	+ 1.64
Mean depth (cm)	180	149.35	- 17.03
Transparency (cm)	77	64.76	- 15.89
pH	8.4	8.3	- 1.19
Total Alkalinity (ppm)	94	106.83	+ 13.65
Salinity (PSU)	8.5	11.47	+ 34.94
Dissolved Oxygen (ppm)	7	7.15	+ 2.14
BOD (ppm)	NR	2.73	0.0
Nitrate (ppm)	0.260	1.12	+ 330.77
Otho Phosphate (ppm)	0.230	0.28	+ 21.74

NR - Not Record

Dussumieridae, Synodontidae, Hemiscylliidae, Sphyrnidae and Rhinobatidae) and five orders (Tetradontiformes, Atheriniformes, Aulopiformes, Orectolobiformes and Rajiformes) were documented for the first time in Chilika Lake during the post-restoration survey. No representatives of two families, namely Chirocentridae and Cobitidae, were found during the survey after opening of the new mouth. Sixty-five species of fish, mostly Gobiidae, were not re-collected during the post-restoration period. Two elasmobranchs (*Glyphis gangeticus* and *Pristis pectinata*) have never been recollected since they were first reported. *Pristis pectinata*, once a widely distributed sawfish, has been eliminated from large areas of its former range, and therefore its absence from Chilika Lake indicates its likely elimination from the lake ecosystem. However, the sawfish recorded as *Pristis pectinata* from Chilika Lake may be referred as *Pristis clavata* as observed by Faria et al. (2013). The Ganges Shark (*Glyphis gangeticus*) was once recorded from Chilika Lake (Chaudhuri 1916b) but the species has never been sighted or reported thereafter. Most literature records and specimens identified as this species are actually Bull Sharks *Carcharhinus leucas* or other carcharhinids. However, after an extensive search over 10 years, a few specimens of this species were sighted in 1996 in the lower reaches of the Ganges River in West Bengal, India (Compagno 2002, 2007). There is no verified marine record of the *G. gangeticus* to date. Therefore the only report from Chilika was perhaps due to misidentification and confusion with *C. leucas*, which definitely occur in the lake.

Migratory and resident species

Out of the total 317 species, 271 (85.49%) and 46 (14.51%) were categorized as migratory and resident species respectively. Therefore the lake fishery is strongly migratory species-dependent. The migratory species are either seasonal migrants or incidental visitors to the lake from both the sea and inflowing rivers. The higher number of migratory species is perhaps due to ecorestoration measures implemented after 2000, particularly the opening of the new lake mouth and resultant improvement in water quality (Table 3). Because migratory species form the major component of the lake fishery, sustainability of ecorestoration measures, particularly the optimal functioning of the lake mouth and Palur canal to enhance recruitment and breeding migrations assume greater significance. Migratory species included 14 catadromous species (*Anguilla bengalensis*, *Anguilla bicolor bicolor*, *Chanos chanos*, *Liza macrolepis*, *Liza melinopterus*, *Liza parsia*, *Liza planiceps*, *Liza subviridis*, *Ellochelon vaigiensis*, *Lates calcarifer*, *Moolgarda cunnesius*, *Moolgarda seheli*, *Moolgarda speigleri* and *Mugil cephalus*) and 13 anadromous species (*Anodontostoma chacunda*, *Brachirus orientalis*, *Hilsa kelee*, *Ilisha megalopectera*, *Pastinachus sephen*, *Pisodonophis boro*,

Pisodonophis cancrivorus, *Rhinomugil corsula*, *Stolephorus commersonnii*, *Tenualosa ilisha* and *Tenualosa toli*).

Categorization of marine, estuarine/brackish and freshwater species

Chilika Lake being an assemblage of marine, brackish and freshwater ecosystems, harbors fish species belonging to these three regimes thereby enhancing ichthyofaunal diversity and contributing to the commercial landings. A modified form of the widely accepted categorization by Elliot et al. (2007) is adapted here to categorize the fishes of Chilika Lake into marine, brackish and freshwater species. All marine species are considered as marine migrants and many of the freshwater species are riverine migrants. Our study of ichthyofaunal diversity in Chilika Lake indicates that marine, brackish and freshwater species constitute 35.65%, 43.85% and 20.50% respectively (Figure 5).

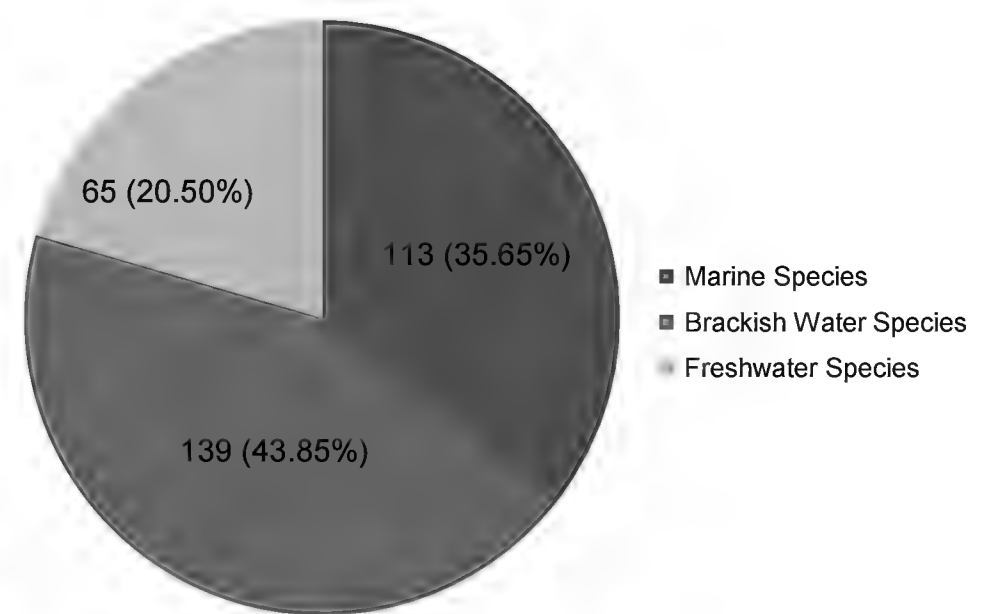


Figure 5. Ichthyofaunal composition of marine, brackish and freshwater species of Chilika Lake.

Faunal characteristics

Faunal characteristics are presented in Table 1. The fish fauna of Chilika Lake includes two endemic gobiid species (*Acentrogobius griseus* and *Bathygobius osteicola*) and one exotic cichlid species (*Oreochromis mossambicus*), which entered the lake during 1998 from aquaculture units on island villages. In total, there are 13 high value target species (*Mystus gulio*, *Strongylura strongylura*, *Channa striata*, *Etroplus suratensis*, *Tenualosa ilisha*, *Hyporhamphus limbatus*, *Lates calcarifer*, *Liza macrolepis*, *Moolgarda cunnesius*, *Mugil cephalus*, *Eleutheronema tetradactylum*, *Daysciaena albida* and *Sillago sihama*) out of a total of 129 commercially important species, these are in large demand in the market and command higher unit prices. The current ichthyofaunal analysis further documented for the first time 114 species belonging to 48 families with ornamental value for home and public aquarium use, a resource with considerable economic potential. Documentation of native

ornamental fish germplasm resources from Chilika Lake calls for conservation and wise use that could potentially augment livelihoods of local communities through small-scale ornamental fish trade and captive breeding practices. Further research is warranted to develop technologies for artificial propagation (captive breeding) and rearing of important native ornamental fishes from Chilika Lake. The faunal characteristics also indicated that 56 species are breeding in the lake and five species (*Daysciaena albida*, *Eleutheronema tetradactylum*, *Gerres setifer*, *Leiognathus equulus* and *Nematalosa nasus*) have two populations, one in the lake and the other in coastal waters. Similarly *Rhinomugil corsula*, the only freshwater mullet in the region, also has two populations one in the lake and the other in the rivers. Out of 317 fish species known so far from Chilika Lake, 278 are known to be food fishes (129 are commercially important – the others are eaten but neither commercially harvested nor have consumers demand).

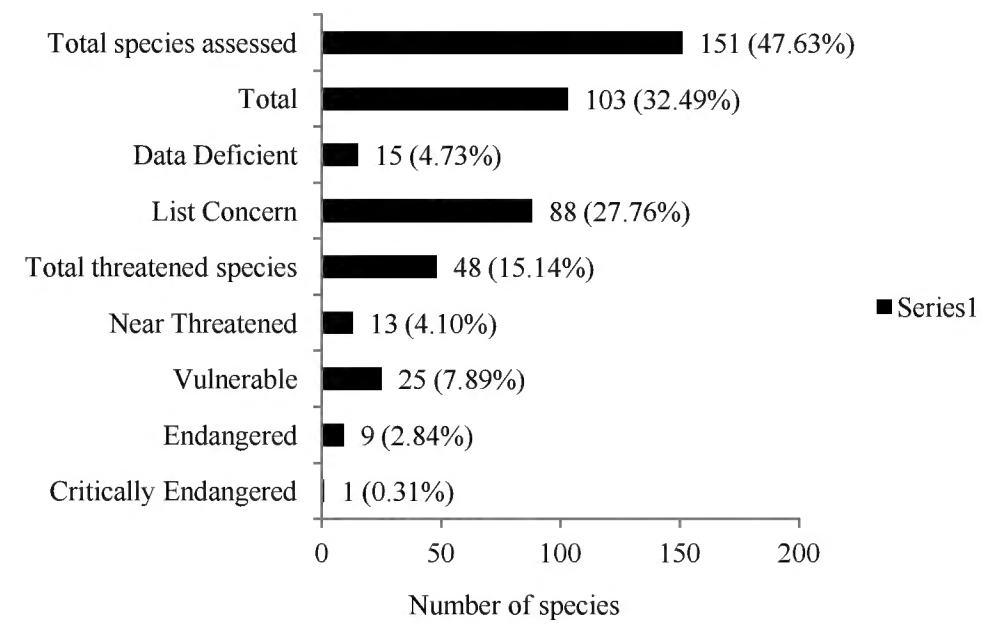


Figure 6. Number of species assessed for different categories of biodiversity status.

Biodiversity status and threatened species

An assessment of biodiversity status for the listed species and assessment of threatened fishes from the total of 317 fish species known from the lake was attempted for the first time in the present study. Review of literature on the biodiversity status of fishes and threatened fishes of India based on IUCN criteria (Ponniah 1993; Molur and Walker 1998; Menon 2004; Barman et al. 2007; Lakra et al. 2010; IUCN 2014; Froese and Pauly 2015) documented a total list of 151 species from Chilika Lake which were assessed for biodiversity status. In total, 35 species in 25 families were recorded as threatened and categorized under Critically Endangered (CR), Endangered (EN), Vulnerable (VU) (Table 4; Figure 6). Further, 13 more species in eight families are categorized as Near Threatened (NT) that need conservation measures unless they may slip to threatened category very soon. Only 88 species (27.76%) were assessed as List Concern (LC), whereas 15 species (4.73%) were categorized as Data Deficient (DD). Most importantly, 166 species (52.36%) of fishes of Chilika Lake were Not Evaluated (NE) for their conservation status. In other words, status of 52.36% of fishes is unknown, and need to be evaluated at least at the national level.

The most of the common threats to the biodiversity of fishes of India stems from various anthropogenic and natural stressors (Das et al. 2004; Kurup and Radhakrishnan 2006; Rout et al. 2007), as has been observed for fishes in Chilika Lake. There, the most relevant threats were degradation of aquatic environment, siltation and encroachment of spawning grounds in the lake by *Ghery* operation, other destructive fishing practices, unabated expansion of illegal large pen culture units (*Gheries*),

Table 4. Assessment of biodiversity status of Chilika fishes (Categorization of threatened and non-threatened species with conservation status).

Family	Conservation status (Number of species by family)								Total species assessed
	CR	EN	VU	NT	Total threatened species	LC	DD	Total	
Acanthuridae (surgeon fishes)						2		2	2
Adrianichthyidae (rice fish)						1		1	1
Ambassidae (perchlets, glass fishes)						4		4	4
Anabantidae (climbing perches)							2	2	2
Anguillidae (freshwater eels)				2	2				2
Aplocheilidae (asian revulines)						1		1	1
Ariidae (sea catfish)						1		1	1
Bagridae (bagrid catfishes)			1		1	3		3	4
Belonidae (needle fishes)						1		1	1
Carangidae (jacks, trevallies, pompanos, scads)						1		1	1
Carcharhinidae (requiem sharks)	1			4	5				5
Channidae (snakeheads, murrels)						4		4	4
Cichlidae (cichlids)				1	1	1		1	2
Clariidae (air-breathing catfish)		1			1				1
Clupeidae (herrings, allies)			2		2	4		4	6
Cobitidae (loaches)						1		1	1
Cyprinidae (carps, minnows)			3		3	20	1	21	24
Dasyatidae (stingrays)			1	1	2		3	3	5

Continued

Table 4. Continued.

Datnioididae (freshwater triple tails)						1		1	1
Eleotridae (gudgeons)						3		3	3
Elopidae (tenpounders)						1		1	1
Engraulidae (anchovies)						2	1	3	3
Gerreidae (silver biddies)						2		2	2
Gobiidae (gobies)						6	3	9	9
Haemulidae (grunts, rubberlips)	1				1	1		1	2
Hemiramphidae (halfbeaks)						1		1	1
Hemiscyllidae (bamboo sharks)			1		1				1
Heteropneustidae (airsac catfish)	1				1				1
Latidae (lates perches/asian seabass)	1				1				1
Leiognathidae (pony fishes, silverbellies)						3		3	3
Mastacembelidae (spiny eels)						3		3	3
Megalopidae (tarpons)							1	1	1
Mugilidae (mulletts)		1			1	4	1	5	6
Muraenesocidae (pike congers)		2			2				2
Myliobatidae (eaglerays)	1	1			2				2
Nandidae (leaf fishes)						1		1	1
Notopteridae (featherbacks)	1				1	1		1	2
Ophichthidae (snake eels)						2		2	2
Osphronemidae (gouramies)						2		2	2
Pangasiidae (shark catfish)		1			1				1
Platycephalidae (flatheads)							1	1	1
Polynemidae (threadfin fishes)		1			1				1
Pristidae (saw fish)	1				1				1
Pristigasteridae (pellonas)	1				1				1
Rhinobatidae (guitar fishes)		1			1				1
Scatophagidae (scats)						1		1	1
Schilbeidae (schilbid catfishes)	1	2			3				3
Sciaenidae (croakers)		2			2	1		1	3
Scombridae (mackerels, seerfishes, tunas, albacores)						2	1	3	3
Serranidae (groupers, rock-cods)		1	2		3		1	1	4
Siganidae (spinsfoots, rabbitfishes)						1		1	1
Siluridae (eurasian catfishes)	1	1	1		3				3
Sisoridae (sisorid catfish)	1	1			2				2
Sphyrnidae (hammerheaded shark)	1		1		2				2
Synbranchidae (swamp eels)						1		1	1
Syngnathidae (pipe fishes, sea horses)		1			1	1		1	2
Terapontidae (terapon perches)						2		2	2
Tetraodontidae (puffers)						1		1	1
Tetrarogidae (waspfishes)						1		1	1
Total	1	9	25	13	48	88	15	103	151
% to the total assessment of species	0.66	5.96	16.56	8.61	23.18	58.28	9.93	76.82	100.00

CR-Critically Endangered; EN- Endangered; VU-Vulnerable; NT-Near Threatened; LC-List Concern; DD-Data Deficient

drastic decline in salinity dynamics, and siltation at the river mouth and Magarmukh (the gateway between the inlet channel and the lake proper). Mohanty et al. (2007) reported that six economic species (*Tenualosa ilisha*, *Rhinomugil corsula*, *Acanthopagrus berda*, *Chanos chanos*, *Megalops cyprinoides* and *Elops machnata*) almost disappeared from commercial landings during the eco-degradation phase but gradually reappeared during the ecorestoration phase.

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LITERATURE CITED

- Allen, G.R., W.T. White and M.V. Erdmann. 2013. Two new species of snappers (Pisces: Lutjanidae: *Lutjanus*) from the Indo-West Pacific. *Journal of the Ocean Science Foundation* 6: 33–51. <http://www.oceansciencefoundation.org/josf6c.html>
- Banerjee, A.C. and N.C. Roychoudhury. 1966. Observation on some physico-chemical features of the Chilika lagoon. *Indian Journal of Fisheries* 13 (1–2): 395–429.
- Barman, R.P., S.S. Mishra, S. Kar, P. Mukherjee and S.C. Saren. 2007. Marine and estuarine fish fauna of Orissa. *Records of the Zoological Survey of India, Occasional Paper* 260: 1–186.
- Bhatta, K.S., A.K. Pattnaik and B.P. Behera. 2001. Further contribution to the fish fauna of Chilika Lagoon, a coastal wetland of Orissa. *Geobios* 28(2–3): 97–100.
- Chaudhuri, B. L. 1916a. Description of two new fishes from Chilika Lake. *Records of Indian Museum*, 12(3): 105–108.
- Chaudhuri, B.L. 1916b. Fauna of the Chilika Lake: Fish Part I. *Memoir of Indian Museum*, 5(4): 403–440.
- Chaudhuri, B.L. 1916c. Fauna of the Chilika Lake: Fish Part II. *Memoir of Indian Museum*, 5(5): 441–458.
- Chaudhuri, B.L. 1917. Fauna of the Chilika Lake: Fish Part III. *Memoir of Indian Museum*, 5(6): 491–508.
- Chaudhuri, B.L. 1923. Fauna of the Chilika Lake. Fish, Part IV. *Memoir of Indian Museum*, 5(11): 711–736.
- Compagno, L.J.V. 2002. Freshwater and estuarine elasmobranch surveys in the Indo-Pacific region: threats, distribution and speciation; pp. 168–180, in: S.L. Fowler, T.M. Reed and F.A. Dipper (eds.). *Elasmobranch biodiversity, conservation and management. Proceedings of the International Seminar and Workshop, Sabah, Malaysia, July 1997. Gland, Switzerland and Cambridge, UK: IUCN SSC Shark Specialist Group.* <https://portals.iucn.org/library/efiles/documents/ssc-op-025.pdf>
- Compagno, L.J.V. 2007. *Glyphis gangeticus*. The IUCN Red List of threatened species. Version 2014.3. Accessed at <http://www.iucnredlist.org>, 24 February 2015.
- Das, P., S.P. De, R.M. Bhowmick, A.C. Nandy, P.K. Pandit, R.C. Sengupta and S.C. Thakurta. 2004. Diminishing Trend of Fish Species Diversity in West Bengal: Field Study. *Fishing Chimes* 24 (1): 73–78.
- De Bruin, G.H.P., B. C. Russell and A. Bogusch. 1994. *FAO species identification field guide for fishery purpose. The marine fishery resources of Sri Lanka.* Rome, FAO, i-x, 1–400, 32 pls.
- Devasundaram, M. P. 1954. A report on the fisheries of the Chilika Lake from 1948 to 1950. *Odisha: Government Publication.* 34 pp.
- Dujovny, E. 2009. The deepest cut: political ecology in the dredging of a new sea mouth in Chilika Lake, Orissa, India. *Conservation, Society* 7(3): 192–2004.
- Elliott, M., A.K. Whitfield, I.C. Potter, S.J.M. Blaber, D.P. Cyrus, F.G. Nordlie and T.D. Harrison. 2007. The guild approach to categorizing estuarine fish assemblage: a global review. *Fish and Fisheries*, 8: 241–268.
- Eschmeyer, W.N. (ed.). 2014. *Catalog of fishes: genera, species, references.* Accessed at <http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>, 20 August 2014.
- Eschmeyer, William N. and Jon David Fong. 2014. Species of fishes by family/subfamily. On-line version dated 26 March 2014. Accessed at <http://research.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp>, 20 August 2014.
- Faria, V.V., M.T. McDavitt, P. Charvet, T.R. Wiley, C.A. Simpfendorfer and G.J.P. Naylor. 2012. Species delineation and global population structure of critically endangered sawfishes (Pristidae). *Zoological Journal of the Linnean Society* 167: 136–164. doi: 10.1111/j.1096-3642.2012.00872.x
- Fischer, W. and G. Bianchi (eds.). 1984. *FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51).* Rome: FAO. Volumes 1–6. <http://www.fao.org/docrep/009/ad468e/ad468e00.htm>
- Froese, R. and D. Pauly (eds.). 2015. *FishBase. World Wide Web electronic publication, version 08/2015.* Accessed at <http://www.fishbase.org>, 13 September 2015.
- Ghosh, A.K. and A.K. Pattnaik. 2005. Chilika Lagoon: experience and lessons learned brief; pp.115–132, in: *UNEP International Waters Learning Exchange and Resource Network.* http://iwlearn.net/iw-projects/1665/experience-notes-and-lessons-learned/chilikalagoon_2005.pdf/view
- Ghosh, A. K., A. K. Pattnaik and T. J. Ballatore. 2006. Chilika lagoon: Restoring ecological balance and livelihoods through re-salinization. *Lakes and Reservoirs, Research Management* 11 (4): 239–255.
- Hora, S. L., 1923. Fauna of the Chilika Lake. Fish, Part V. *Memoir of Indian Museum* 5(11): 737–769.
- IUCN (International Union for the Conservation of Nature). 2014. *IUCN Red list of threatened species, version 2014.2.* Accessed at <http://www.iucnredlist.org>, 13 October 2014.
- Jayaram, K.C. 2010. *The freshwater fishes of the Indian region. Revised 2nd ed. Delhi: Narendra Publishing House.* 616 pp.
- Jones, S. and K.H. Sujanshingi. 1954. Fish and fisheries of the Chilika Lake with statistics of the catches for the years 1948–1950. *Indian Journal of Fisheries* 1(1–2): 256–344.
- Kottelat, M. 2013. The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology, Supplement No. 27:* 1–663.
- Koumans, F.P. 1941. Gobioid fishes of India. *Memoir of Indian Museum* 13(3): 205–313.
- Krishnan, S. and S.S. Mishra 2001. Fauna of Godavari estuary. *Fishes estuarine ecosystem series 4.* Kolkata: Zoological Survey of India. iv + 166 pp. <http://faunaofindia.nic.in/PDFVolumes/ess/004/index.pdf>
- Kurup, B. Madhusoodana and K.V. Radhakrishnan. 2006. Freshwater fish biodiversity of Kerala: status and utilisation for commercial fishing, food security and livelihood. *Fishing Chimes* 25 (10): 111–122.
- Lakra, W.S., U.K. Sarkar, A. Gopalakrishnan and A. Kathirvelpandian. 2010. *Threatened freshwater fishes of India.* Lucknow: National Bureau of Fish Genetic Resources (ICAR). 20 pp.
- Mangla, B. 1989. Chilika Lake: Desilting Asia's largest brackishwater lagoon. *Ambio* 18(5): 298–299.
- Menon, A.G.K. 2004. *Threatened fishes of India and their conservation.* Zoological Survey of India. 170 pp.
- Menon, M. A. S. 1961. On a collection of fish from lagoon Chilika, Orissa. *Records of Indian Museum*, 59(1–2): 41–69.
- Mishra, S.S. and S. Krishnan. 1997. On the occurrence of *Thryssa kammalensis* (Bleeker) and *Thryssa kammalensisoides* Wongratana (Engraulidae: Pisces) from India. *Records of Zoological Survey of India*, 97(2): 109–111.
- Misra, K.S. 1976a. *Pisces: the fauna of India and adjacent countries.* Vol. 2. 2nd ed. New Delhi: Manager Publications. 438 pp.
- Misra, K.S. 1976b. *Pisces: the fauna of India and adjacent countries.* Vol. 3. 2nd ed. New Delhi: Manager Publications. 367 pp.
- Misra, K.S. 1962. *An aid to the identification of the common com-*

- mercial fishes of India and Pakistan. Records of Indian Museum. 57(1-4): 320 pp.
- Misra, K.S. 1969. Pisces: the fauna of India and adjacent countries. Vol 1. 2nd ed. New Delhi: Manager Publications. 276 pp.
- Mohanty, R.K., A. Mohapatra and S.K. Mohanty. 2009. Assessment of the impacts of a new artificial lake mouth on the hydrobiology and fisheries of the Chilika Lake, India. Lakes, Reservoirs: research and Management 14: 231-245. doi: 10.1111/j.1440-1770.2009.00406.x
- Mohanty, S.K., K.S. Bhatta, R.K. Mohanty, S. Mishra, A. Mohapatra and A.K. Pattnaik. 2007. Eco-restoration impact on fishery biodiversity and population structure in Chilika Lake; pp. 24-44: in: P.K. Mohanty (ed.). Lakes and Coastal Wetlands. Dordrecht, Netherlands: Springer Netherlands. doi: 10.1007/978-1-4020-6646-7_1
- Mohanty, S.K. 1973. Further additions to the fish fauna of the Chilika Lake. Journal of Bombay Natural History Society 72(3): 863-866.
- Mohapatra, A., R.K. Mohanty, S.K. Mohanty, K.S. Bhatta and N.R. Das. 2007. Fisheries enhancement and biodiversity assessment of fish, prawn and mud crab in Chilika lagoon through hydrological intervention. Wetlands ecology and Management 15(3): 229-251.
- Mohapatra, A., D. Ray and P.C. Tudu. 2013. New record of Convict Surgeonfish *Acanthurus triostegus* (Linnaeus, 1758) from Chilika Lake. Records of Zoological Survey of India 113 (4): 75-77.
- Mohapatra, A., D. Ray, P.C. Tudu and S.S. Mishra. 2014. Range extension and first report of *Monodactylus kottelati* (Perciformes: *Monodactylidae*) from Chilika Lagoon, east coast of India. Marine Biodiversity Records 7: e11. doi: 10.1017/S1755267214000013
- Molur Sanjay and Sally Walker (eds). 1998. Report of the Workshop "Conservation Assessment and Management Plan for Freshwater Fishes of India", Zoo Outreach Organization, Conservation Breeding Specialist Group, India, Coimbatore, India. 156 pp.
- Nelson, J.S. 2006. Fishes of the world. 4th ed.). Hoboken, USA: John Wiley, Sons. 601 pp.
- Ponniah, A.G. 1993. Categorisation of Indian threatened fishes; pp. 375-387, in: P.V. Dehadrai, P. Das and S.R. Verma. Threatened fishes of India: Proceedings of the National Seminar on Endangered Fishes of India Held at National Bureau of Fish Genetic Resources, Allahabad on 25 and 26 April 1992. Muzaffarnagar: Nature Conservators.
- Raiol, R.D.O., W.B. Wosiacki and L.F.A. Montag. 2012. Fish of the Taiassui and Benfca river basins, Benedides, Para (Brazil). Check List 8(3): 491-498. <http://www.checklist.org.br/getpdf?SLO37-11>
- Rajan, S., S. Pattnaik and N.C. Basu. 1968. New records of fishes from the Chilika Lake. Indian Journal of the Zoological Society of India 20(1-2): 80-93.
- Ramarao, K.V. 1995. Pisces; pp. 483-506, in: Fauna of Chilika Lake. Wetland ecosystem series 1. Calcutta: Zoological Survey of India.
- Rao, D.V. 2009. A field Guide to Fishes (Chilika Lake, Odisha, East Coast of India). New Delhi: Vedams eBooks. 252 p
- Rout, S.K., S. Malla, B.K. Das, R.K. Trivedi and J.K. Sundaray. 2007. Conservation of Indian threatened ichthyofauna — Immediate implications. Fishing Chimes 27(5): 40-44.
- Roy, J.C and N. Sahoo. 1957. Additions to the fish fauna of the Chilika Lake. Journal of Bombay Natural History Society 54: 943-953.
- Satapathy, D. and S. Panda. 2009. Fish atlas of Chilika. Bhubaneswar, Orissa: . Chilika Development Authority. 74 pp.
- Siddiqi, S.Z. and K.V. RamaRao. 1995. Limnology of Chilika Lake; pp. 11-136, in: Fauna of Chilika Lake. Wetland ecosystem series 1. Calcutta: Zoological Survey of India.
- Talwar, P.K. and A.G. Jhingran. 1991. Inland fishes of India and adjacent countries. New Delhi: Oxford / IBH Publing Company. Volumes 1 and 2: 1077 pp.
- Talwar, P.K. and R.K. Kacker. 1984. Commercial sea fishes of India. Handbook No. 4. Calcuta: Zoological Survey of India. 997 pp.
- UNESCO (United Nations Educational, Scientific and Cultural Organization). 2014. Chilika Lake. Accessed at <http://whc.unesco.org/en/tentativelists/5896/>, 6 October 2015.
- Venkateswarlu, T. 1990. Ecology and systematic of gobioid fishes of Kakinda Bay (Andhra Pradesh). Indian Society of Ichthyologists. Special Publication 2: 1-26.
- World Bank. 2005. Scenario assessment of provision of environmental flows to Lake Chilika from Naraj Barrage, Orissa, India. Reports from the environmental flows window of the bank Netherlands water partnership programme (World Bank) to the Government of Orissa, India. 40 pp.
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